DRAFT

Marine Mammal Protection Act Section 101(a)(5)(E)
Amended Negligible Impact Determination
CA/OR/WA Humpback Whale
CA/OR/WA Sperm Whale

National Marine Fisheries Service
Protected Resources Division
West Coast Region
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2.0 List of Abbreviations

CA	California
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CV	Coefficient of variation
Emergency Rule	Temporary Emergency Rule for the drift gillnet fishery
ESA	Endangered Species Act
FMP	Fishery Management Plan
F_r	Recovery Factor
g(0)	Probability of trackline detection
GAMMS	Guidelines for Assessing Marine Mammal Stocks
HCM/SI	Human-Caused Mortality and Serious Injury
IWC	International Whaling Commission
LOF	List of Fisheries
MMPA	Marine Mammal Protection Act
MNPL	Maximum Net Productivity Level
M/SI	Mortality and Serious Injury
N_{min}	Minimum population estimate
NMFS	National Marine Fisheries Service
OR	Oregon
PBR	Potential Biological Removal
Plan	Pacific Offshore Cetacean Take Reduction Plan
R_{max}	Maximum theoretical net productivity rate
SAR	Stock Assessment Report
Team	Pacific Offshore Take Reduction Team
WA	Washington

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5.0 Executive Summary

Section 101(a)(5)(E) of the Marine Mammal Protection Act (MMPA), 16 U.S.C. 1361 *et seq.*, states that NOAA's National Marine Fisheries Service (NMFS) shall for a period of up to three years allow the incidental taking of marine mammal species listed under the Endangered Species Act (ESA), 16 U.S.C. 1531 *et seq.,* by persons using vessels of the United States and those vessels which have valid fishing permits issued by the Secretary (50 CFR 216.103**;** 50 CFR 229.2) in accordance with section 204(b) of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1824(b) (50 CFR 660), while engaging in commercial fishing operations, if NMFS makes certain determinations. NMFS must first determine, after notice and opportunity for public comment, that:

(1) the incidental mortality and serious injury from commercial fisheries will have a negligible impact on the affected species or stock;

(2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and

(3) where required under section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock.

NMFS issued an MMPA 101(a)(5)(E) permit on September 4, 2013 (78 FR 54553), valid for a period of up to three years and expiring on September 4, 2016. The supporting negligible impact determination included an analysis for determining whether the incidental mortality and serious injury from the California thresher shark/swordfish drift gillnet fishery (≥14 in mesh) would have a negligible impact on California (CA)/Oregon (OR)/Washington (WA) stocks of fin whales, humpback whales and sperm whales and the WA/OR/CA sablefish pot fishery would have a negligible impact on CA/OR/WA humpback whale stock.

The negligible impact determination issued on September 4, 2013 (78 FR 54553) stated that it could be re-evaluated pursuant to section 101(a)(5)(E)(iii), (iv), and (v) of the MMPA (16 U.S.C. 1371 (a)(5)(E)(iii), (iv), and (v))[1]. Given these provisions under the MMPA and presentation of new information since the issuance of the negligible impact determination on September 4, 2013, a proposed modification to the negligible impact determination analysis (78 FR 54553; September 4, 2013) is presented here. This modification would not extend the expiration date and therefore remains effective until September 4, 2016. For this negligible impact determination we did not analyze the incidental mortality and serious injury from the California thresher shark/swordfish drift gillnet fishery (≥14 in mesh) on the California/Oregon/Washington stock of fin whales because there has been no observed take of a fin whale in this fishery for 15 years, since 1999. If there is take of a fin whale from any Category I or II fishery, we will re-evaluate

[1] "The Secretary may amend or modify, after notice of opportunity for public comment, the list of fisheries published under clause (ii) whenever the Secretary determines there has been a significant change in the information or conditions used to determine such list."

pursuant to section 101(a)(5)(E)(iii), (iv), and (v) of the MMPA (16 U.S.C. 1371 (a)(5)(E)(iii), (iv), and (v)).

This document presents the analyses for determining whether the incidental mortality and serious injury from the California thresher shark/swordfish drift gillnet fishery (≥14 in mesh) will have a negligible impact on the CA/OR/WA stocks of humpback whales and sperm whales and whether the incidental mortality and serious injury from the Washington WA/OR/CA sablefish pot fishery will have a negligible impact on the CA/OR/WA humpback whale stock.

Fisheries Considered for Authorization

The MMPA mandates that each commercial fishery be classified by the level of mortality and serious injury (M/SI) of marine mammals that occurs incidental to each fishery. The List of Fisheries (LOF) classifies U.S. commercial fisheries into one of three categories according to the level of incidental mortality or serious injury of marine mammals. This classification is based on the rate, in numbers of animals per year, of incidental mortality and serious injury of marine mammals due to commercial fishing operations relative to a stock's potential biological removal (PBR) level, defined as the maximum number of animals (*e.g.*, whales per year), not including natural mortality, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (50 CFR 229.2).

The CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) is listed as Category I and the WA/OR/CA sablefish pot fishery is listed as Category II (79 FR 14418; March 14, 2014). Thus, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and the WA/OR/CA sablefish pot fishery are the fisheries currently considered for authorization. All other Category II fisheries that interact with the marine mammal stocks observed off the coasts of Washington, Oregon, and California are state-managed and are not considered for authorization under this permit. The total HCM/SI calculated to make a negligible impact determination for this authorization included all human sources, such as commercial fisheries and ship strikes.

Criteria for Determining Negligible Impact

In 1999, NMFS adopted criteria for making negligible impact determinations for MMPA 101(a)(5)(E) permits (64 FR 28800; May 27, 1999). In applying the 1999 criteria to determine whether mortality and serious injury incidental to commercial fisheries will have a negligible impact on a listed marine mammal stock, Criterion 1 (total known, assumed, or extrapolated human-caused serious injury and mortality (HCM/SI) are less than 10% of PBR) is the starting point for analysis. If this criterion is satisfied (*i.e.*, total known, assumed, or extrapolated HCM/SI are less than 10% of PBR), the analysis would be concluded as a negligible impact. The remaining criteria describe alternatives under certain conditions, such as fishery mortality below the negligible threshold but other human-caused mortality above the threshold or fishery and other human-caused mortality between the negligible threshold and PBR for a stock that is increasing or stable. If Criterion 1 is not satisfied, NMFS may use one of the other criteria as appropriate.

We considered two time frames for this analysis: 5 years (2009-2013) and 13 years (2001-2013). The first time frame we considered for both stocks of whales was the most recent five-year period (here, January 1, 2009 through December 31, 2013) and is typically used for negligible impact determination analyses. A five-year time frame provides enough data to adequately capture year-to-year variations in take levels while reflecting current environmental and fishing conditions as they may change over time. However, NMFS' Guidelines for Assessing Marine Mammal Stocks (GAMMS) suggest that mortality estimates could be averaged over as many years as necessary to achieve a Coefficient of Variation (CV) of less than or equal to 0.3. Caretta and Moore (2014) recommend pooling longer time series of data particularly when bycatch is a rare event[2]. For example, pooling 10 years of fishery data resulted in bycatch estimates within 25% of the true bycatch rate over 50% of the time (estimates were within 25% of the true value more often than not). Key to this approach, however, was that the underlying pooled fishery data reflected a fishery with sufficiently constant characteristics (effort, gear, locations, etc.,) to pool the data, such as with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). Rare bycatch events typically involve smaller populations paired with low observer coverage for that fishery. If true bycatch mortality is low, but near PBR, then estimation bias needs to be reduced to allow reliable evaluation of the bycatch estimate against a low removal threshold.

Currently, the CA/OR/WA sperm whale stock is the only ESA-listed marine mammal species with a relatively low minimum population estimate (N_{min}) that has recently been recorded by NMFS Federal fishery observers as having been killed or seriously injured in the CA thresher shark/swordfish drift gillnet fishery (≥ 14 in mesh). However, fishery interactions with the CA/OR/WA stock of sperm whales are still considered a rare event. Moore and Barlow (in press) used a Bayesian hierarchical trend model for sperm whales to more efficiently incorporate available survey information, to calculate the population abundance estimate by using a longer time series to improve the precision of abundance estimates. The post-2000 time period best represents the current spatial state of the fishery and is used to calculate mean annual bycatch estimate for sperm whales, based on recommendations contained in the GAMMS and Carretta and Moore (2014). Therefore, the corresponding time frame was used to estimate the CA/OR/WA stock of sperm whale abundance.

While fishery interactions with the CA/OR/WA stock of humpback whales are also considered rare events, we used the 5-year time frame for estimating bycatch of this stock because applying a longer time series has not yet been conducted for this stock. In the future, using a longer time series of bycatch data may be applied to other rarely caught marine mammal species, such as the humpback whale, but this analysis has not been conducted to date.

In Appendix 3 we provide an evaluation of mortality and serious injury from all sources for three possible time frames for both species considered in this analysis 5-year (2009-2013), 13-year

[2] The Pacific Offshore Take Reduction Team met in February 2014 and reached consensus on recommendations to reduce sperm whale bycatch in the fishery (see Key Outcomes Memorandum). As part of their consensus recommendations, the Team recommended that NMFS and the Scientific Review Groups examine the efficacy of increasing the number of years used in the mortality estimates for a stock, beyond five years, in cases where mortality/serious injury events are very rare and a larger pool of years might improve the precision and accuracy of mortality/serious injury. In order to increase the accuracy of the bycatch estimate, Caretta and Moore (in press) recommend pooling longer time series of data.

(2001-2013), and 16-year (1998-2013)) even though not all of those time frames were used in the negligible impact determination for each species and the application of a longer time frame for humpbacks has not been applied, for the reasons provided above. For the CA/OR/WA sperm whale stock, in particular, the negligible impact determination issued in September 2013 used the PBR current at that time of 1.5 animals and a 5-year time frame; measures to reduce bycatch of sperm whales were in place and NMFS made a negligible impact determination. Since then, the PBR has been revised and in this analysis we use a PBR of 2.7 sperm whales and the 13-year time frame as explained above. To offer the reader a comprehensive review of the most recent PBR estimates for sperm whales and the application of the negligible impact determination criterion, we provide in Appendix 4, a comparison using a PBR of 1.5 and a PBR of 2.7 animals across each time frame. Even though we provide this comparison, a PBR of 2.7 animals is the only PBR level used to make the negligible impact determination here.

Only the mortality and serious injury incidental to commercial fishing in the two fisheries interacting with these stocks is subject to the negligible impact determination, and the M/SI is determined to be below PBR for the CA/OR/WA stocks of humpback and sperm whales.

Negligible Impact Determinations

In considering the appropriate criteria to use for determining whether federally-managed commercial fisheries off the U.S. west coast are having a negligible impact on the CA/OR/WA stocks of humpback whales and sperm whales, Criterion 1 was not satisfied because the total known, assumed, or extrapolated HCM/SI for these stocks are not less than 10% of PBR for the respective time period considered. The 5-year (2009-2013) average annual HCM/SI to the CA/OR/WA stock of humpback whales from all human sources is 5.0, or 45.45% of the PBR. The 13-year (2001-2013) average annual HCM/SI to the CA/OR/WA stock of sperm whales from all human sources is 1.7, or 65.50% of the PBR. As a result, the other criteria must be examined for the CA/OR/WA stocks of humpback and sperm whales.

Criterion 2 is satisfied if total known, assumed, or extrapolated *human-caused* M/SI *are greater than* PBR and the total known or extrapolated *fisheries-related* mortality *is less than* 10% of PBR. Criterion 2 was not satisfied for the CA/OR/WA stocks of humpback whales or sperm whales for each time frame considered; and, as a result, the other criteria were examined.

Criterion 3 is satisfied for a stock if the total known or extrapolated fishery-related M/SI is greater than 10% of and less than 100% of PBR, and the population is increasing. Criterion 3 was satisfied for the CA/OR/WA humpback whale stock as the total known fishery-related M/SI from all commercial fisheries for the CA/OR/WA humpback whale stock is estimated at 40.00% of PBR (5-year average from 2009-2013). Accordingly, Criterion 3 is satisfied in determining that mortality and serious injury of the CA/OR/WA humpback whale stock incidental to commercial fishing would have a negligible impact on the stock because of individual review of data regarding the stock, including increased growth rate of the stock (8% per year), limited increases in mortality and serious injury due to the relevant fisheries, and the level of HCM/SI is below the calculated PBR.

Criterion 3 was satisfied for the CA/OR/WA sperm whale stock as the total known or extrapolated fishery-related M/SI is greater than 10% of and less than 100% of PBR, and the population is stable. The fishery-related M/SI from all commercial fisheries for the CA/OR/WA sperm whale stock is estimated at 57.00% (13-year[3]) of PBR. A total of two sperm whales were observed by NMFS' federal observers as either seriously injured or killed in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) since 1998, and none have interacted with the WA/OR/CA sablefish pot fishery. Because those 3 sperm whales were observed by NMFS' federal observers, the numbers of animals that interacted with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) are extrapolated by the percent observer coverage for that year. Thus, in 1998, the observer coverage was 20% and the one observed animal is extrapolated to a total of five animals. Similarly, in 2010, the two animals that interacted with the CA thresher shark/swordfish drift gillnet (≥14 in mesh) fishery were observed at an observer coverage rate of 11.9%, resulting in an extrapolated value of 16 total animals. Moore and Barlow (in press) provided new analyses that suggest that the new abundance estimates are higher and more stable across years than currently published values. Accordingly, Criterion 3 is satisfied in determining that mortality and serious injury of the CA/OR/WA sperm whale stock incidental to commercial fishing would have a negligible impact on the stock because of individual review of data regarding the stock, including that the stock is stable, and the level HCM/SI is below the calculated PBR.

In conclusion, based on the criteria outlined in 1999 (64 FR 28800), the 2013 U.S. Pacific Marine Mammal Stock Assessment (SAR; Carretta *et al.*, 2014), Carretta and Moore (2014), Moore and Barlow (in press), and the best scientific information and data available, NMFS has determined that the proposed modification to the negligible impact determination issued on September 4, 2013 and the remainder of the period of up to three years, expiring September 4, 2016, mortality and serious injury incidental to the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and the WA/OR/CA sablefish pot fishery will have a negligible impact on the CA/OR/WA stock of humpback whales, and the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) will have a negligible impact on the CA/OR/WA stock of sperm whales. Therefore, vessels operating in these identified commercial fisheries within the range of the CA/OR/WA humpback and sperm whale stocks may be permitted subject to their individual review and the certainty of relevant data, and provided that the other provisions of section 101(a)(5)(E) are met.

[3] In marine mammal stock assessments, NMFS utilizes a strategy of pooling bycatch estimates across multiple years to account for inter-annual variability in observer coverage, cetacean abundance and distribution, oceanography, and fishing practices. Annual estimates of bycatch are typically pooled across 5-year periods to calculate mean annual mortality levels (NMFS 2005; Moore and Merrick 2011), though guidelines for the preparation of stock assessment reports (NMFS 2005) allow for other pooling periods to be used: "It is suggested that mortality estimates could be averaged over as many years necessary to achieve a CV of less than or equal to 0.3, but should usually not be averaged over a time period of more than the most recent 5 years for which data have been analyzed. However, information that is more than 5 years old should not be ignored if it is the most appropriate information available in a particular case. "

6.0 Introduction

Section 101(a)(5)(E) of the Marine Mammal Protection Act (MMPA), 16 U.S.C. 1361 *et seq.*, states that NOAA's National Marine Fisheries Service (NMFS), as delegated by the Secretary of Commerce, shall for a period of up to three years allow the incidental taking of marine mammal species listed under the Endangered Species Act (ESA), 16 U.S.C. 1531 *et seq.*, by persons using vessels of the United States and those vessels which have valid fishing permits issued by the Secretary (50 CFR 216.103**;** 50 CFR 229.2) in accordance with section 204(b) of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1824(b) (50 CFR 660), while engaging in commercial fishing operations, if NMFS makes certain determinations. NMFS must first determine, after notice and opportunity for public comment, that:

(1) the incidental mortality and serious injury from commercial fisheries will have a negligible impact on the affected species or stock;

(2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and

(3) where required under section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock.

NMFS issued a negligible impact determination September 4, 2013 (78 FR 54553), valid for a period of up to three years and expiring on September 4, 2016. The negligible impact determination included an analysis for determining whether the incidental mortality and serious injury from the California thresher shark/swordfish drift gillnet fishery (≥14 in mesh) would have a negligible impact on California (CA)/Oregon (OR)/Washington (WA) stocks of fin whales, humpback whales and sperm whales and the WA/OR/CA sablefish pot fishery would have a negligible impact on CA/OR/WA humpback whale stock.

The negligible impact determination issued on September 4, 2013 (78 FR 54553 stated that it could be re-evaluated pursuant to section 101(a)(5)(E)(iii), (iv), and (v) of the MMPA (16 U.S.C. 1371 (a)(5)(E)(iii), (iv), and (v)). Given these provisions under the MMPA and presentation of new information since the issuance of the negligible impact determination on September 4, 2013, a proposed modification to the negligible impact determination analysis (78 FR 54553; September 4, 2013) is presented here. This proposed modification would not extend the expiration date and therefore remains effective until September 4, 2016. For this proposed negligible impact determination we did not analyze the incidental mortality and serious injury from the California thresher shark/swordfish drift gillnet fishery (≥14 in mesh) on the California/Oregon/Washington stock of fin whales because there has been no observed take of a fin whale in this fishery for the past15 years, since 1999. If there is take of a fin whale from any Category I or II fishery, we will re-evaluate pursuant to section 101(a)(5)(E)(iii), (iv), and (v) of the MMPA (16 U.S.C. 1371 (a)(5)(E)(iii), (iv), and (v)).

The purpose of this document is to explain the analyses and rationale for determining whether mortality and serious injury incidental to commercial fisheries will have a negligible impact on the CA/OR/WA stock of sperm whales (*Physeter macrocephalus*) and the CA/OR/WA stock of humpback whales (*Megaptera novaeangliae*), which are listed as endangered under the ESA (*i.e.*, determination (1) above). The following eight Category I or II (as defined in the MMPA and described in Section 4.0) Federally- and State-managed commercial fisheries are within the range of the CA/OR/WA sperm and humpback whale populations and have been observed to interact with, and in some cases, cause M/SI to these whales[4].

Fishery	Category	Marine Mammal Stock(s)
CA thresher shark/swordfish drift gillnet drift gillnet fishery (≥14 in mesh)	I	CA/OR/WA sperm whale and CA/OR/WA humpback whale
CA halibut/white seabass and other species set gillnet (>3.5 in mesh)	II	CA/OR/WA humpback whale
CA yellowtail, barracuda, white seabass drift gillnet (≥3.5 in mesh and < 14 in mesh)	II	CA/OR/WA humpback whale
CA spot prawn pot fishery	II	CA/OR/WA humpback whale
CA Dungeness crab pot fishery	II	CA/OR/WA humpback whale
Oregon Dungeness crab pot fishery	II	CA/OR/WA humpback whale
WA/OR/CA sablefish pot fishery	II	CA/OR/WA humpback whale
WA coastal Dungeness crab pot/trap fishery	II	CA/OR/WA humpback whale

Of the eight fisheries described above, only the two federally managed fisheries, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and the WA/OR/CA sablefish pot fishery will be considered for authorization. The other six fisheries are managed by the State(s) and were not considered for authorization under this permit. However, the total known HCM/SI calculated to make a negligible impact determination for this authorization did include all human sources, such as state-managed commercial fisheries *(i.e.*, including the six Category II fisheries listed above) and ship strikes. Determinations related to recovery plans and related to the requirements of MMPA section 118 will be made in a *Federal Register* notice to issue the necessary permit.

6.1 Process and Criteria for Issuing a MMPA section 101(a)(5)(E) Permit

Among the requirements of MMPA section 101(a)(5)(E) to issue a permit to take ESA-listed marine mammals incidental to commercial fishing, NMFS must determine whether the taking of marine mammals would have a negligible impact on the affected stock or stocks of marine mammals. Such determinations are required only in MMPA section 101(a)(5) and are currently required in authorizing the take of small numbers of any stock of marine mammals incidental to activities other than commercial fishing (Sections 101 (a)(5)(A) and (D)) or in permitting the take of threatened or endangered marine mammals incidental to commercial fishing operations (Section 101(a)(5)(E)).

[4] Fisheries as classified in the 2014 List of Fisheries (79 FR 14418; March 14, 2014).

Within the MMPA's provisions, NMFS must determine if the taking (by harassment, injury, or mortality – or a combination of these) incidental to specified activities will have a negligible impact on the affected stocks of marine mammals. For permitting the take of threatened or endangered marine mammals incidental to fishing operations, NMFS must determine if mortality and serious injury incidental to commercial fisheries will have a negligible impact on the affected species or stock(s) of marine mammals.

NMFS has implemented procedures including a qualitative definition of negligible impact, through regulations at 50 CFR 216.103, and has relied upon qualitative and quantitative approaches to determine the levels of taking that would result in a negligible impact to affected stocks of marine mammals. The quantitative approach is better suited for mortality and serious injury than for non-lethal takes because mortality and serious injury are considered removals from the population and can be evaluated by well-documented models of population dynamics.

NMFS' regulations implementing the MMPA amendments of 1981 included a regulatory definition for "negligible impact":

> Negligible impact *is an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival* (50 CFR 216.103[5]).

This qualitative definition of negligible impact was the standard NMFS used to implement the Small Take Program from its beginning in 1981 through 1994, when additional amendments to the MMPA were enacted and a more quantitative approach was developed for assessing what level of removals from a population stock of marine mammals could be considered a negligible impact. The qualitative definition remains the only regulatory definition of negligible impact for implementing the MMPA.

In 1998, NMFS published a notice (63 FR 71894; December 30, 1998) advising the public that the agency was extending for a 6-month period the 3-year permit issued nationwide to fisheries in 1995 to authorize the taking of threatened or endangered marine mammals. This notice also informed the public that NMFS considered the 6-month extension of the permit as an opportunity to review existing criteria for the issuance of permits and to address issues that have arisen since the permits were first issued. NMFS solicited public comments to develop alternatives to 10% of PBR as a criterion for determining negligible impact; however, none were received.

Having received no comments upon which to develop alternatives for determining negligible impact, NMFS published a notice proposing to issue permits under MMPA section 101(a)(5)(E) in 1999 (64 FR 28800; May 27, 1999). The notice contained a statement that NMFS, through internal deliberation, had adopted the following criteria for making negligible impact determinations for such permits:

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[5] 50 CFR 216.103 specifically applies to the Small Take Program (the Small Take Program no longer called by this name, rather the information is found under NMFS' Incidental Take Authorizations under the MMPA). However, the definition of "negligible impact" in 50 CFR 229.2, which implements MMPA sections 101(a)(5)(E) and 118, provides, "*Negligible impact* has the same meaning as in §216.103 of this chapter."

1. The threshold for initial determination will remain at 10% of PBR. If the total human-related M/SI are less than 10% of PBR, all fisheries may be permitted.

2. If total human-related serious injuries and mortalities are greater than PBR, and fisheries-related mortality is less than 0.1 PBR, individual fisheries may be permitted if management measures are being taken to address non-fisheries-related serious injuries and mortalities. When fisheries-related M/SI is less than 10 percent of the total, the appropriate management action is to address components that account for the major portion of the total.

3. If total fisheries-related M/SI are greater than 10% of PBR and less than PBR, and the population is stable or increasing, fisheries may be permitted subject to individual review and certainty of data. Although the PBR level has been set up as a conservative standard that will allow recovery of a stock, there are reasons for individually reviewing fisheries if serious injuries and mortalities are above the threshold level. First, increases in permitted serious injuries and mortalities should be carefully considered. Second, as serious injuries and mortalities approach the PBR level, uncertainties in elements such as population size, reproductive rates, and fisheries-related mortalities become more important.

4. If the population abundance of a stock is declining, the threshold level of 10% of PBR will continue to be used. If a population is declining despite limitations on human-related serious injuries and mortalities below the PBR level, a more conservative criterion is warranted.

5. If total fisheries-related M/SI are greater than PBR, permits may not be issued.

This set of criteria maintained 10% of PBR (from 1995) as the starting point in negligible impact determinations and explicitly noted ways in which determinations could deviate from the default. Criterion 3 notes that NMFS may give special consideration if the affected stock of marine mammals is stable or increasing and may permit take incidental to fishing even if incidental removals exceed 10% of PBR but are below PBR.

7.0 Action Area-California, Oregon, and Washington

The action area is the U.S. Exclusive Economic Zones (EEZ) off the coasts of California, Oregon, and Washington where fishing vessels are managed under a fishery management plan (FMP) (Figure 1; see Appendix 2 for more information and http://www.pcouncil.org/groundfish/fishery-management-plan/ for the most current groundfish FMP and amendments)

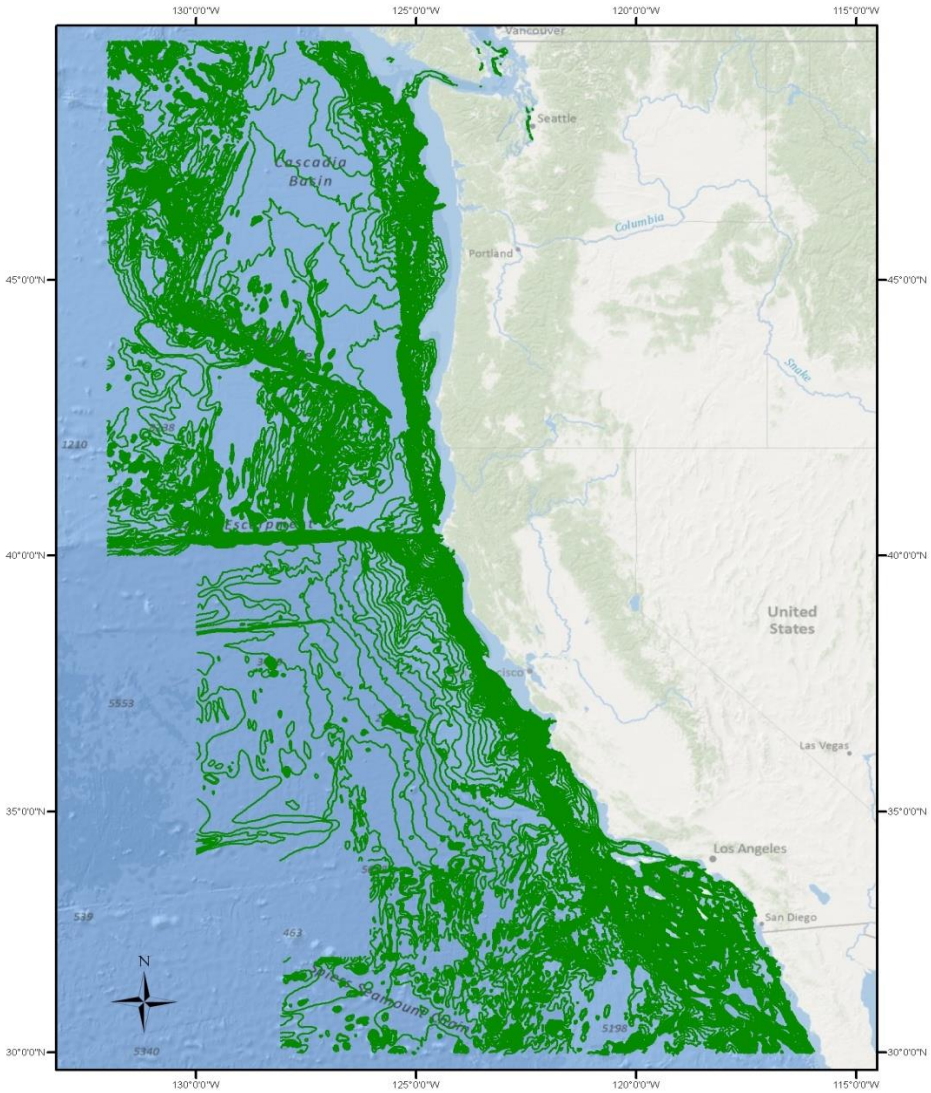

Figure 1. Action area off the coasts of California, Oregon, and Washington. Green lines delineate bathymetry within the U.S. Exclusive Economic Zone.

8.0 Category I and II Fisheries in the Action Area

Under the MMPA, fisheries are classified according to their incidental mortality and/or serious injury of marine mammals. Each fishery is evaluated on a per-stock basis; thus a fishery may qualify as one category for one marine mammal stock and another for a different marine mammal stock. A fishery is categorized on the MMPA LOF at its highest classification (*e.g.*, a fishery qualifying for Category III for one marine mammal stock and for Category II for another marine mammal stock will be listed under Category II). Category I fisheries have frequent incidental mortality and serious injury of marine mammals and Category II fisheries have occasional incidental mortality and serious injury of marine mammals. Category III fisheries

have a remote likelihood of, or no known incidental mortality and serious injury of, marine mammals. Additional details are provided in the preamble to the proposed rule implementing section 118 of the MMPA (60 FR 45086; August 30, 1995).

The fisheries included in Table 1 have been classified as either a Category I or II fishery in the 2014 LOF (79 FR 14418; March 14, 2014), based on the level of M/SI of marine mammals that occurs incidental to each fishery. Of these fisheries, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), CA halibut/white sea bass and other species set gillnet fishery (>3.5 in mesh), CA yellowtail, barracuda, and white seabass drift gillnet (mesh size ≥3.5 in and <14 in), CA spot prawn fishery, CA Dungeness crab pot fishery, OR Dungeness crab pot fishery, WA/OR/CA sablefish pot fishery, and WA coastal Dungeness crab pot/trap fishery have had documented interactions with ESA-listed marine mammal species off the coasts of California, Oregon, and Washington and are described in Table 1. However, only the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and WA/OR/CA sablefish pot fishery will be covered under this authorization because they are the only two federally-managed Category I or II fisheries that have been documented to interact with marine mammal species off the coasts of California, Oregon, and Washington.

A full description of these and all the fisheries listed in the LOF may be found in the published 2013 Pacific and Alaska SARs (Carretta *et al.*, 2014; Allen and Angliss, 2014), and online at http://www.nmfs.noaa.gov/pr/interactions/lof/.

The following provides a brief description of each Category I and II fishery analyzed, *i.e.*, the CA thresher shark/swordfish drift gillnet fishery (≥14 inch mesh) and the WA/OR/CA sablefish pot fishery. This does not include those fisheries that are State-managed or with "None" recorded in Table 1 under "ESA-Listed Marine Mammals Incidentally Killed/Injured." NMFS described each Category I and II fishery in detail in the final 2008 LOF (72 FR 66048; November 27, 2007) and these descriptions can also be found at http://www.nmfs.noaa.gov/pr.interactions/lof/.

Table 1. Category I and II Fisheries off the coasts of California, Oregon, and Washington (sources: 2014 List of Fisheries (79 FR 14418) and a self-report from an owner/operator of a commercial fishing vessel). The two fisheries considered in this permit are in Bold.

Fishery Description	ESA-Listed Marine Mammals Incidentally Killed/Injured
Category I	
CA thresher shark/swordfish drift gillnet (≥14 inch mesh)	**Humpback whale - CA/OR/WA stock** **Sperm whale-CA/OR/WA stock**
Category II	
CA yellowtail, barracuda, white seabass and tuna drift gillnet fishery (mesh size ≥3.5 inches and <14 inches)	None recorded
CA halibut/white sea bass and other species set gillnet (>3.5 in mesh)	Humpback whale-CA/OR/WA
CA yellowtail, barracuda, and white seabass drift gillnet (mesh size ≥3.5 in and <14 in)	None recorded
CA spot prawn pot	Humpback whale - CA/OR/WA stock
CA Dungeness crab pot	Humpback whale - CA/OR/WA stock
OR Dungeness crab pot	Humpback whale - CA/OR/WA stock
WA/OR/CA sablefish pot	**Humpback whale - CA/OR/WA stock**
WA coastal Dungeness crab/pot	Humpback whale - CA/OR/WA stock
CA anchovy, mackerel, sardine purse seine	None recorded
CA squid purse seine	None recorded

Category I Federally-Managed Fisheries

CA thresher shark/swordfish drift gillnet fishery (≥14 inch mesh)

The Final 2014 LOF (78 FR 14418; March 14, 2014) lists the CA thresher shark/swordfish drift gillnet fishery (≥ 14 in mesh) as a Category I fishery. The Final 2012 LOF (76 FR 73912) elevated the category of the fishery to a Category II fishery from a Category III fishery, due to a self-report from the owner of a vessel fishing in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), reporting an incidental entanglement with a humpback whale off of San Diego, California, in January 2009. Additionally, on December 5, 2010, NMFS Southwest Fisheries Observer Program recorded two sperm whales entangled in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). One animal was found dead and the other was released alive, but was seriously injured as gear remained attached to the animal. As a result of the sperm whale takes in 2010, the final 2013 LOF (78 FR 53336, August 29, 2013) reclassified the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) from a Category II fishery to a Category I fishery. The self-report and observer data likely represent the

CA/OR/WA stock of humpback whales and the CA/OR/WA stock of sperm whales. Therefore, these takes are included in the total estimate of HCM/SI under each of the appropriate negligible impact sections for humpback and sperm whales.

The CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) targets swordfish and thresher shark. This fishery is a limited entry fishery with seasonal closures and gear restrictions (see Appendix 2). The CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) operates outside of state waters to about 150 miles offshore ranging from the U.S./Mexico border in the south to the Oregon border in the north, depending on sea temperature conditions (Figure 2). Regulations restrict the fishery to waters outside 200 nautical miles (nm) from February 1 through April 30, outside 75 nm from May 1 through August 14, and fishermen are allowed to fish inside 75 nm from August 15 through January 31 (Figures 2 and 3). CA thresher shark/swordfish drift gillnet vessels targeting swordfish tend to set on warm ocean water temperature breaks, which do not appear along the California coast until late summer; therefore, vessels are not active during February, March, and April, and very little fishing effort occurs during the months of May, June, and July.

In 2001, a seasonal (15 August-15 November) area closure was implemented in the thresher shark/swordfish drift gillnet fishery (≥14 in mesh) north of Point Conception, to protect leatherback turtles that feed in the area and were observed entangled in previous fishing seasons (Figure 2). Additional seasonal/area closures in southern California have been established in the thresher shark/swordfish drift gillnet fishery (≥14 in mesh) to protect loggerhead turtles during a forecast or occurring El Niño event during the months of June, July and/or August.

At this time, no other fishery has documented takes of individuals from this stock of sperm whales. In 2013, the level of sperm whale take from commercial fisheries was above that year's current sperm whale PBR of 1.5 (Carretta *et al.*, 2012), and a negligible impact determination under the MMPA could not be made for sperm whales, if the fishery continued to operate under the status quo. As a result, NMFS convened the Pacific Offshore Cetacean Take Reduction Team (Team) on July 31 and August 7, 2013. The Team was charged with developing recommendations to reduce the sperm whale M/SI rate in the CA thresher shark/swordfish drift gillnet fishery (≥14 inch mesh) to below PBR (1.5). NMFS considered the Team's recommendations and published an emergency rule on September 4, 2013 (78 FR 54547) that modified the CA thresher shark/swordfish drift gillnet fishery (≥14 inch mesh) to reduce the risk of incidental mortality and serious injury of sperm whales incidental to the fishery, such that the negligible impact determination conditions of the MMPA section 101(a)(5)(E) could be met, thereby allowing NMFS to provide incidental take authorization under the ESA and MMPA.

As a result of the modifications to the fishery and because the underlying data indicated that there was a very low likelihood that another fishery may take a sperm whale, on September 4, 2013, NMFS issued a permit for a period of up to three years to authorize the incidental, but not intentional taking of individuals from the CA/OR/WA humpback, fin, and sperm whale stocks by the CA thresher shark/swordfish drift gillnet fishery (≥14inch mesh) under Section 101(a)(5)(E) of the MMPA (78 FR 54553).

On February 4-6, 2014, NMFS reconvened the Team to consider short-term and long-term measures to reduce sperm whale M/SI in the CA thresher shark/swordfish drift gillnet fishery (≥14 inch mesh) in subsequent fishing seasons because the emergency rule was only valid for the 2013-2014 fishing season. The Team reached consensus and among their recommendations, the Team asked that NMFS consider alternative methods to improve abundance and bycatch estimates when fishery interactions are rare or infrequent. Shortly after the Team met in February 2014, NMFS did consider more accurate methods to evaluate population abundance estimates for sperm whales. Those methods, described in detail in Carretta and Moore (2014) and Moore and Barlow (in press), used data from 2001-2012 (Carretta and Moore, 2014) and 1991-2008 (Moore and Barlow, in press), and resulted in a revised minimum population abundance estimate and PBR for sperm whales of 2.7 whales per year. Because of this revised PBR, NMFS reconvened the Team on April 15, 2014 to discuss the methods described in Carretta and Moore (2014) and Moore and Barlow (in press). In light of this substantial new information, the Team is revisiting their previous consensus recommendations.

Figure 2. CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) area. The dotted area indicate the leatherback sea turtle conservation area, in effect from August 15-November 15, annually, and the hatched area delineates the loggerhead time/area closure during a forecast or occurring El Niño event.

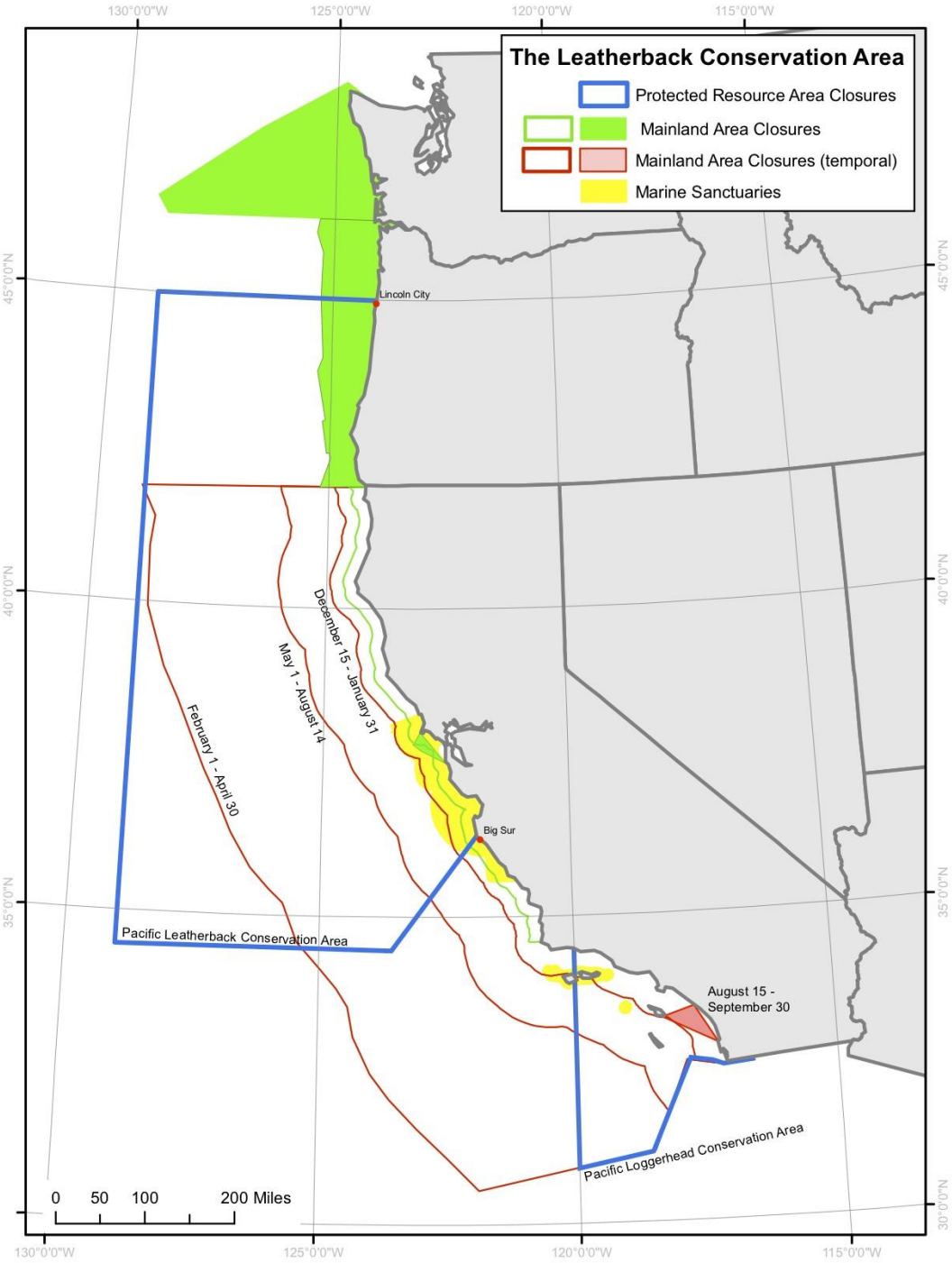

Figure 3. CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) area with areas designating the sea turtle conservation areas and time area closures. Regulations restrict the fishery to waters outside 200 nm from February 1 through April 30, outside 75 nm from May 1 through August 14, and inside 75 nm from August 15 through January 31.

The number of vessels active in this fishery from 1998-2013 are shown in Table 2. Information on the number of active permit holders is obtained from the *Status of the U.S. West Coast Fisheries for Highly Migratory Species through 2004*; *Stock Assessment and Fishery Evaluation* report, available from the Pacific Fishery Management Council website (www.pcouncil.org). Figure 4 is a map of observed sets from August 2001 to January 2010, pre-November 15 and post-November 15, to show the changes in effort due to time/area closures to protect leatherback turtles. Table 3 shows a summary of fishing effort and the number of observed sets for the thresher shark/swordfish drift gillnet fishery(≥14 in mesh), beginning with the year 2000, the year before the time/area closures were implemented.

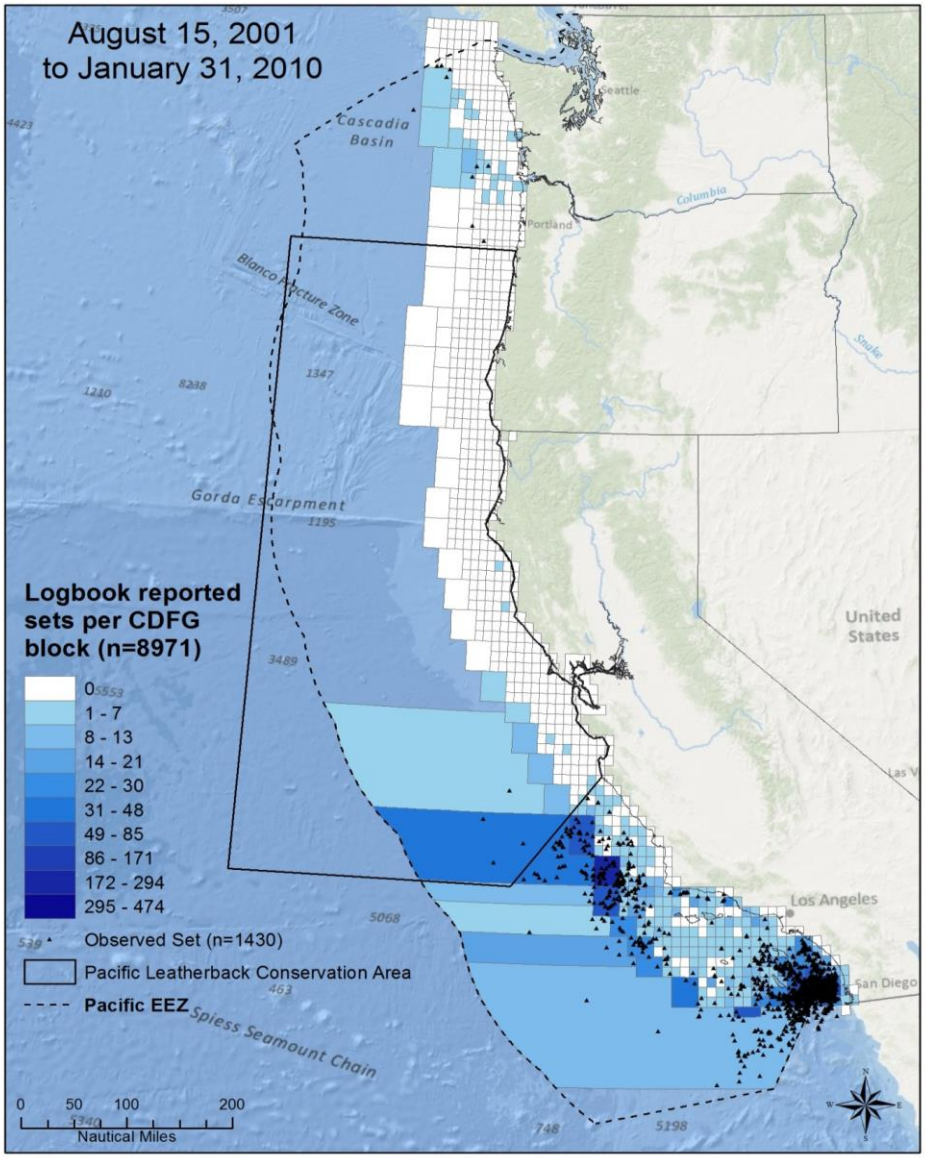

Figure 4. CA thresher shark/swordfish drift gillnet (≥14 in mesh) logbook-reported fishing effort and observed sets from August 15, 2001, to January 31, 2010. Although the fishing season runs a full year (August 15-August 14), no reported effort occurred during this time period outside of the August 15-January 31 timeframe. The solid line shows the leatherback sea turtle conservation area.

Table 2. Annual drift gillnet permits issued and number of active vessels, 1998–2013.

	Active Vessels	Permits Issued
Year		
1998	98	148
1999	84	136
2000	78	127
2001	69	114
2002	50	106
2003	43	100
2004	40	96
2005	42	90
2006	45	88
2007	46	86
2008	46	85
2009	46	84
2010	27	82
2011	19	82
2012	15	78
2013	19	72

Source: California Department of Fish and Wildlife License and Revenue Branch (LRB), extracted June 13, 2014. Additional processing information:

1-some vessels only land thresher and/or swordfish from year to year so the highest number of active vessels for both components of the fishery was reported for this gear.

*-actual number of permits issued by LRB not available but the California State Legislature set a cap of 150 in 1982.

Table 3. Summary of CA thresher shark/swordfish drift gillnet (≥14 in mesh) Observer Program from 2000-2013 (January to December; NMFS 2014).

Fishing Season	Estimated Total Fishing Effort (Sets)	Total Number of Observed Sets	Percent Observer Coverage
2000	1936	444	22.9%
2001	1665	339	20.4%
2002	1630	360	22.1%
2003	1467	298	20.3%
2004	1084	223	20.6%
2005	1075	225	20.9%
2006	1433	266	18.6%
2007	1241	204	16.4%
2008	1103	149	13.5%
2009	761	101	13.3%
2010	492	59	12.0%
2011	435	85	19.5%
2012	445	83	18.7%
2013	470	176	37.4%

Observer Information

The NMFS' West Coast Region has operated an at-sea federal observer program in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) since July 1990, and the California Department of Fish and Wildlife had operated a drift gillnet observer program from 1980–90. The objectives of the NMFS Observer Program are to record, among other things, information on non-target fish species and protected species interactions. Information regarding the thresher shark/swordfish drift gillnet fishery (≥14 in mesh) interactions with listed marine mammal species, summarized in Table 1, was drawn from Observer Program records for the calendar years 1990–2013 (NMFS, 2014). Observer coverage (see Figure 3 for observed sets including temporal component and sea turtle closure) of the thresher shark/swordfish drift gillnet (≥14 in mesh) fleet typically targets 20 percent of the annual sets made in the fishery, with close to 100 percent of net retrievals monitored on observed trips for, among other things, species identification and enumeration. The Emergency Rule (78 FR 54547) temporarily modified observer coverage in certain areas as shown in Figure 5 and included a mandate for a vessel monitoring system.

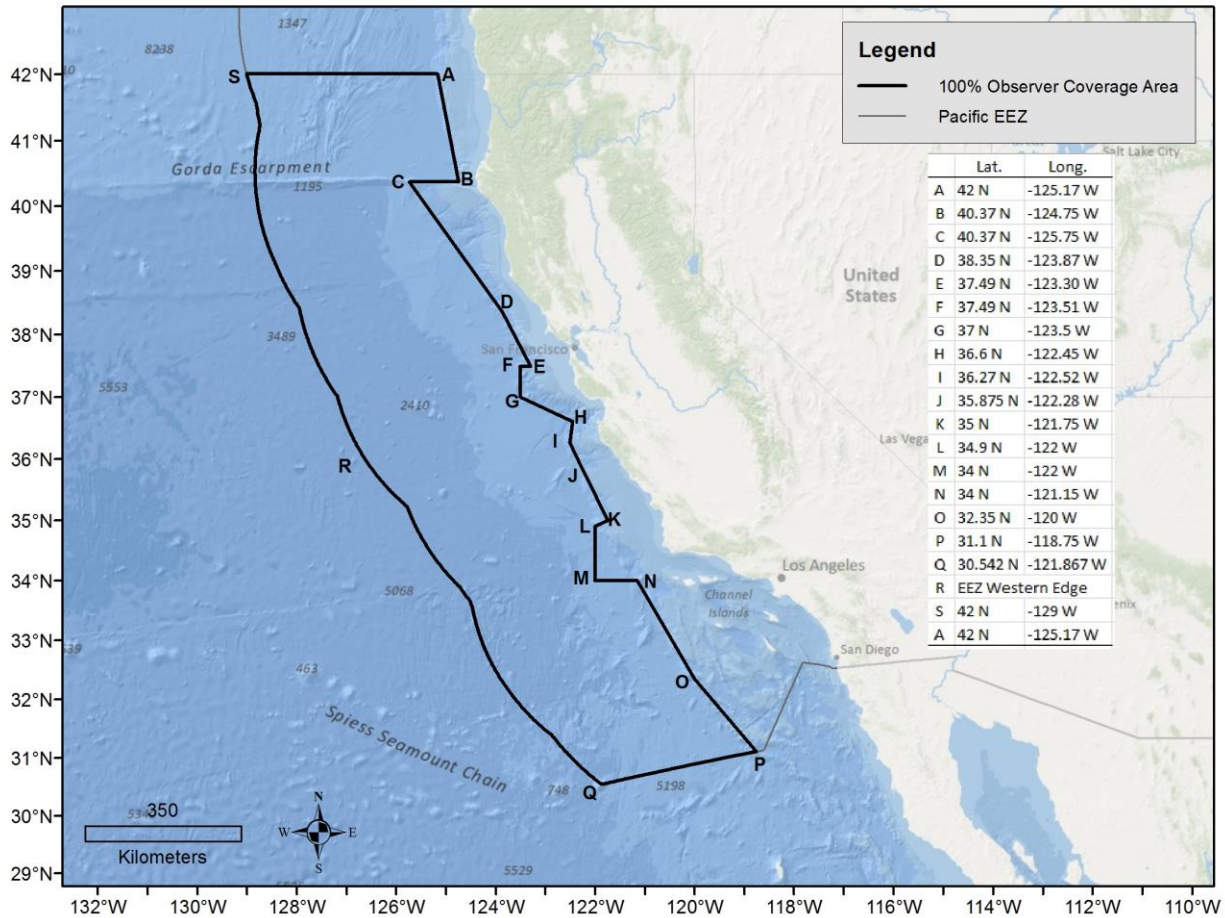

Figure 5. As described by the Emergency Rule measures for the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) area. Points A-S-A designate the 100% observer coverage zone.

Category II Federally-managed fisheries

WA/OR/CA sablefish pot fishery

The WA/OR/CA sablefish pot fishery targets sablefish using trapezoid, conical, or rectangular steel frame traps, wrapped with 3.5 inch nylon webbing (NMFS, 2005). The fishery sets gear in waters past the 100 fathom curve off the west coast of the U.S. (Figure 6). The fishery is managed under regulations implementing the West Coast Groundfish FMP developed by the Pacific Fishery Management Council. There are two separate trap fisheries for sablefish, limited entry and open access. The primary fishery, limited entry, is composed of a three tier system of cumulative landing quotas within a restricted season, from April 1 to October 31 (Pacific Coast Groundfish FMP, December 2011). Permits were assigned to a tier based on landing history when the system originally began in 1998 (Saez *et al.*, 2013). There are 32 Limited Entry Permits issued for the sablefish trap fishery on the west coast (NWFSC, 2010), and the estimated number of current participants is 309. Fishing outside of the primary season or after fulfillment of tier quota is allowed subject to daily and weekly trip limits (NWFSC, 2010). The limited entry permits are currently associated with vessels spread throughout the Pacific Northwest from Northern California through Washington (L. Saez, pers. comm., 2014). Up to three permits may

be filed for cumulative landings on one vessel, including both trap and longline gear endorsements (NWFSC, 2010). Accounting for stacking of permits, there were forty-one vessels using traps only and five using a combination of traps and longline to catch their quota of sablefish in 2014 (NWFSC, 2014).

In California, a general trap permit is required for the open access sector for sablefish and gear is set outside 150 fathoms, with an average depth of 190 fathoms. South of Point Arguello, near Santa Barbara, the minimum depth for setting traps targeting sablefish is 200 fathoms. There is no depth requirement north of Point Arguello. Daily logbook reporting is required. Multiple traps are connected to a common ground line, 5/8th inch nylon floating line, at depths between 100 and 375 fathoms up to 600 fathoms with an average of 190 fathoms in California (NMFS, 2010a). Traps are spaced on average 20 fathoms apart, with a range of 15 to 40 fathoms (NMFS, 2005). Limited entry permit holders will commonly fish 20 to 30 traps per string, as opposed to open access fishermen who fish several smaller strings of one to eight strings with three to four traps per string (NMFS, 2010a), each with a float line and buoy stick.

Figure 6. Map of the WA/OR/CA sablefish pot fishery.

9.0 Marine Mammal Species Listed under the ESA in the Action Area

According to the *U.S. Pacific Marine Mammal Stock Assessments: 2013* (Carretta *et al.*, 2014) and *Alaska Marine Mammal Stock Assessments: 2013* (Allen and Angliss, 2014), there are nine species of marine mammals listed under the ESA that occur within the area of operation of Category I and II fisheries off the coasts of California, Oregon, and Washington. These species, including their status, are listed in Table 4.

Table 4. ESA-Listed Marine Mammal Species off the coasts of California, Oregon, and Washington.

Species	Stock	Status
Blue whale (*Balaenoptera musculus*)	Eastern North Pacific stock, (formerly the California/Oregon/Washington-Mexico stock)	Endangered
Fin whale (*Balaenoptera physalus)*	California/Oregon/Washington stock	Endangered
Humpback whale (*Megaptera novaeangliae*)	California/Oregon/Washington stock, (formerly the Eastern North Pacific stock and California/Oregon/Washington-Mexico stock)	Endangered
Gray whale (*Eschrictius robustus*)	Western North Pacific stock	Endangered
North Pacific right whale (*Eubalaena japonica*)	Eastern North Pacific stock	Endangered
Sei whale (*Balaenoptera borealis*)	Eastern North Pacific stock	Endangered
Sperm whale (*Physeter macrocephalus*)	California/Oregon/Washington stock	Endangered
Killer whale (*Orcinus orca*)	Eastern North Pacific Southern Resident stock	Endangered
Guadalupe fur seal (*Arctocephalus townsendii*)	Mexico	Threatened

NMFS issued a 101(a)(5)(E) permit on October 30, 2000 (65 FR 64670) for the currently named CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) to incidentally take, during the course of commercial fishing operations: sperm whales, humpback whales, fin whales, and Steller sea lions, based on documented takes in the fishery. For that assessment, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) operated over a broader area than it currently operates, including fishing in the currently closed area north of Point Conception during August 15 through November 15. Blue whales, North Pacific right whales, and sei whales were not

included in the October 2000 permit and will not be included further in this analysis because they have never been observed to interact with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) or the WA/OR/CA sablefish pot fishery. Interactions with fishing gear have been recorded in stranded Guadalupe fur seals; however, we are not able to identify the gear to a fishery at this time, and they will not be considered further in this document. Since NMFS began observing the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) in 1990, fishery interactions have not been observed for blue whales, North Pacific right whales, sei whales, and Guadalupe fur seals. Given 23 years of observer data, logbook information, self-reports and stranding information (whale entanglement reports), NMFS does not anticipate takes of blue whales, North Pacific right whales, sei whales, or Guadalupe fur seals by any of the federally-managed Category I and II fisheries off the coasts of California, Oregon, and Washington.

In 2005, the Eastern North Pacific Southern Resident stock of killer whales was listed as endangered under the ESA (70 FR 69903; November 18, 2005). Most sightings of this stock of killer whales have occurred in the summer in the inland waters of Washington state and southern British Columbia. Pods belonging to this stock have also been sighted in coastal waters off southern Vancouver Island and Washington (Bigg *et al.*, 1990; Ford *et al.*, 2000). Of the three pods comprising this stock, one pod (J) is commonly sighted in inshore waters in winter, while the other two pods (K and L) apparently spend more time offshore (Ford *et al.*, 2000). These latter two pods have been observed in recent years in Monterey Bay, California, near the Farallon Islands, and off Point Reyes. Thus, the entire range for the Southern Resident killer whale is as far south as Monterey, CA and based on a recent review by the Department of Fisheries and Oceans (Canada) of photographs taken in 2007, as far north as Chatham Strait, Southeast, Alaska. One killer whale from the non-ESA listed eastern North Pacific Transient Stock was observed taken in 1995 in the CA thresher shark/swordfish drift gillnet (≥14 in mesh) (Carretta *et al*., 2006). Set gillnets and longlines may take killer whales, based on information gathered on similar fisheries in other areas (Carretta *et al*., 2006), but the total annual fishery M/SI for this killer whale stock is zero (Carretta *et al.*, 2012). Thus, NMFS does not anticipate the incidental take (serious injury or mortality) of the Eastern North Pacific Southern Resident killer whale by the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) or the WA/OR/CA sablefish pot fishery, and therefore, this stock will not be considered further in this assessment.

Fin whales are widely distributed in the world's oceans; however, there is insufficient information to accurately determine population structure of the fin whale (Carretta *et al.*, 2006). For more detailed information on fin whales, refer to the Fin Whale Recovery Plan (NMFS, 2010b) and the SARs (Carretta *et al.*, 2014).

Fin whales are found year-round off southern and central California, in the summer off the coast of Oregon, and in the summer and fall in the Gulf of Alaska. Observations show aggregations of fin whales year-round off southern and central California (Dohl *et al*., 1983; Barlow, 1997; Forney *et al.*, 1995), and in summer off the coast of Oregon (Green *et al.*, 1992; McDonald, 1995). Acoustic signals from fin whales are detected year-round off northern California, Oregon, and Washington, with a concentration of vocal activities between September and February (Moore *et al*., 1998). Since fin whale abundance appears lower in winter/spring in

California (Dohl *et al*., 1983; Forney *et al*., 1995) and in Oregon (Green *et al*., 1992), it is likely that the distribution of this stock extends seasonally outside these coastal waters.

The negligible impact determination (78 FR 54553; September 4, 2013) provides a detailed description of entanglements and ship strikes impacting the CA/OR/WA stock of fin whales from 1998-2011 and will not be discussed in detail here. The CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) is the only fishery that has interacted with fin whales from this stock, and one fin whale death has been observed since 1990 when NMFS began observing the fishery (Carretta *et al.*, 2014). In 1999, a fin whale interacted with drift gillnet gear, but was released alive and died some time later, a male that was confirmed by genetic analysis. Mean annual takes for this fishery (Carretta *et al.*, 2014) are based on 2008-2012 data (Carretta *et al.*, 2005, Carretta and Enriquez, 2006, 2007, 2009a, 2009b, 2012). This results in an average estimate of zero fin whales taken annually. During the past 23 years (1990-2013), five CA/OR/WA fin whales have been recorded as having interacted with fishing gear; thus NMFS concludes the risk of a fin whale entanglement in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) is very low and although fin whales and the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) are known to co-occur in areas off the California and Oregon coasts. Given this, there is a remote likelihood that the California thresher shark/swordfish drift gillnet fishery (≥14 in mesh) will take fin whales. NMFS does not anticipate incidental take (serious injury or mortality) of the CA/OR/WA fin whale stock by the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) or the WA/OR/CA sablefish pot fishery, and therefore, this stock will not be considered further in this assessment.

Gray whales are presently recognized as two populations in the North Pacific Ocean and recent genetic studies using both mitochondrial and nuclear markers have demonstrated significant differentiation between the western North Pacific (WNP) and eastern North Pacific (ENP) populations (Lang *et al.*, 2004; Weller *et al.*, 2004; Lang *et al.*, 2005; Swartz *et al.*, 2006; Weller *et al.*, 2006; Weller *et al.*, 2007; Brownell *et al.*, 2009; LeDuc *et al.*, 2002; Lang, 2010; Lang *et al.*, 2010; Lang *et al.*, 2011). In 1994, ENP gray whales were removed from the ESA list of endangered and threatened species (59 FR 31094), and the WNP gray whales continue to be listed as endangered under the ESA. ENP and WNP gray whales were once considered geographically separated along either side of the ocean basin, but recent photo-identification (Urban *et al.*, 2012; Weller *et al.*, 2012), genetic (Lang, 2010; Lang *et al.*, 2011), and satellite tracking data (Mate *et al.*, 2011) have documented spatial and temporal overlap between WNP and ENP gray whales.

The timing of the majority of effort in the drift gillnet fishery (≥14 in mesh) overlaps with the gray whale southbound migration along the U.S. west coast (November to February), but there are a number of fishing restrictions during this time that may limit the overlap between migrating gray whales and drift gillnet fishing. Northbound gray whales, which include all age classes, migrate from February to June, and therefore, are not expected to overlap with any drift gillnet fishing.

From 1998 to 2013, four gray whales have been observed by the NMFS fishery observer program interacting with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) (Enriquez, pers. comm., 2014). The assumption has been that these whales were ENP gray

whales. All three observations occurred in the month of January in an area west of San Diego and south of San Clemente: one in 1998 (alive); one in 1999 (dead); one in 2005 (alive) and one in 2013 (dead). Although the total documented interactions with drift gillnet gear may be a minimum, as some interactions may have been unobserved, the likelihood that a gray whale would interact with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) is low. Historically, records suggest that gray whale strandings have been commonly associated with gillnet gear, although no positive identification of drift gillnet gear can be made from those records outside the observer program (Saez *et al*., *In prep*). With the exception of the Southern California Bight, the area where the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) occurs is outside of the majority of the traditional gray whale southbound migratory route. All of the documented interactions between gray whales and the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) have occurred in the Southern California Bight in January, which coincides with a large proportion of the ENP population migrating through the area at that time. Based on tagging data, it is assumed that when WNP gray whales migrate along the coast of North America to Baja, California, they are likely slightly delayed from the ENP's "start date" by at least a couple of weeks based on distance and average swim speed (*i.e.*, they have to swim from Sakhalin Island, Russia before joining the ENP route). The first migratory ENP gray whales can be observed in California as early as October, depending on the year, but mid-to late November is typical and approximately 10% of the population is expected to have made the migration by the end of December. Thus, it is possible that a WNP gray whale's migratory route could overlap with the drift gillnet fishing area, particularly from November to January during the southbound migration and most likely in the Southern California Bight region, based on the distribution of drift gillnet fishing effort in that area. However, there is no evidence indicating that WNP gray whales behave differently than an ENP whale and are more susceptible to interaction with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). Therefore, similar to ENP gray whales, the likelihood that a WNP gray whale would interact with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) is low.

The current minimum population estimate for ENP gray whales is 19,126 (Carretta *et al*. 2006). The most recent estimate (for 2012), using a Bayesian individually-base stage-structured model, resulted in a median 1+(non-calf) estimate of 155 individuals, with a 95% CI=142-165 (IUCN 2012). Given that only some small portion of these WNP gray whales could be expected to be part of the approximately 20,000 gray whales migrating through the Southern California Bight during any given year that might be exposed to the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), and the already low probability of a gray whale entanglement occurring, the likelihood that a WNP gray would be entangled in CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) gear is low. In addition, no gray whales have been observed to interact with the WA/OR/CA sablefish pot fishery.

NMFS does not anticipate the incidental take (M/SI) of the WNP gray whale by the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) or the WA/OR/CA sablefish pot fishery; therefore, this stock will not be considered further in this assessment.

10.0 Marine Mammals Considered in This Analysis

For this assessment, NMFS will consider the impact of mortality and serious injury of the CA/OR/WA sperm whale and humpback whale stocks incidental to the following commercial fisheries: the CA thresher shark/swordfish drift gillnet fishery(≥14 in mesh) and the WA/OR/CA sablefish pot fishery. Detailed information on each of these species can be found in the recovery plan for the sperm whale and humpback whale[6]; SARs[7]; and Pacific Offshore Take Reduction Plan[8]. Information from these sources that is relevant to this analysis and the best available science is summarized below for the CA/OR/WA stocks of humpback whale and sperm whale.

10.1 CA/OR/WA Stock of Humpback Whales

The IWC first protected humpback whales from commercial harvest in the North Pacific in 1966. They are also protected under CITES. In the U.S. humpback whales were listed as "endangered" under the ESA of 1973 and are therefore classified as depleted and strategic under the MMPA.

10.1.1 Status of the Species - Humpback Whales

Humpback whales are distributed worldwide in all ocean basins. They typically migrate between tropical/sub-tropical and temperate/polar latitudes, occupying tropical areas during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, when they are feeding.

Because fidelity appears to be greater in feeding areas than in breeding areas, the stock structure of humpback whales is defined based on feeding areas. A photo-identification study in 2004-2006 estimated the abundance of humpback whales in the entire Pacific Basin to be approximately 21,808 (CV=0.04) (Calambokidis *et al.* 2008; Barlow *et al.* 2011). Barlow (2010) recently estimated 1,090 (CV=0.41) humpback whales from a 2008 summer/fall ship line-transect survey of California, Oregon, and Washington waters. Abundance estimates from photographic mark-recapture surveys conducted in California and Oregon waters every year from 1991 through 2011 represent the most current estimates (Calambokidis 2013). These estimates include only animals photographed in California and Oregon waters and not animals that are part of the separate feeding group found off Washington state and southern British Columbia (Calambokidis *et al.* 2009). California and Oregon estimates range from approximately 1,100 to 2,600 animals, depending on the choice of recapture model and sampling period (Carretta *et al.* 2014). The best estimate of abundance for California and Oregon waters is taken as the 2008-2011 Darroch estimate of 1,729 (CV = 0.03) whales, which is also the most precise estimate (Calambokidis 2013).
Calambokidis *et al.* (2008) reported a range of photographic mark-recapture abundance estimates (145–469) for the northern Washington and southern British Columbia feeding group most recently in 2005. The best model estimate from that paper (lowest AIC_c score) was reported as 189 (CV not reported) animals. This estimate is approximately 8 years old and will soon be

[6] http://www.nmfs.noaa.gov/pr/recovery/plans.htm#mammals
[7] http://www.nmfs.noaa.gov/pr/sars/
[8] **http://www.nmfs.noaa.gov/pr/interactions/trt/poctrp.htm**

outdated for use in stock assessments. Combining abundance estimates from both California/Oregon and Washington/southern British Columbia feeding groups (1,729 + 189), yields an estimate of 1,918 (CV≈0.03) animals for the California/Oregon/Washington stock. The approximate CV of 0.03 for the combined estimate reflects that a vast majority of the variance is derived from the California and Oregon estimate (CV=0.03) and that no CV was provided for the Washington state and southern British Columbia estimate.

The proportion of calves in the California/Oregon/Washington stock from 1986 to 1994 appeared much lower than previously measured for humpback whales in other areas (Calambokidis and Steiger 1994), but in 1995-97 a greater proportion of calves were identified, and the 1997 reproductive rates for this population are closer to those reported for humpback whale populations in other regions (Calambokidis *et al.* 1998). Despite the apparently low proportion of calves, two independent lines of evidence indicate that this stock was growing in the 1980s and early 1990s (Barlow 1994; Calambokidis *et al.* 2003) with a best estimate of 8% growth per year (Calambokidis *et al.* 1999). The current net productivity rate is unknown.

Under the MMPA, the PBR is defined as the product of the minimum population estimate, one half the maximum theoretical net productivity rate, and a recovery factor (Fr): PBR= N_{MIN} x $0.5R_{MAX}$ x Fr (0.3). The PBR level for this stock is calculated as the minimum population size (1,855) times one half the estimated population growth rate for this stock of humpback whales (½ of 8%) times a recovery factor of 0.3 (for an endangered species, with Nmin > 1,500 and $CV(_{Nmin}) < 0.50$), resulting in a PBR of 22. Because this stock spends approximately half its time outside the U.S. EEZ, the PBR allocation for U.S. waters is 11 whales per year. (Carretta *et al.* 2014).

10.1.2 Threats - Humpback Whales

Here we provide a brief summary of the threats to humpback whales as they are applicable to the negligible impact determination, but more detailed information can be found in the Humpback Whale Recovery Plan (available at http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_humpback.pdf) and the SARs (available at http://www.nmfs.noaa.gov/pr/sars/). Threats to humpback whales include vessel disturbance, climate change, illegal whaling or resumed legal whaling, reduced prey abundance due to overfishing or other factors (including climate change), habitat degradation, disturbance from low-frequency noise, disease, impacts related to research, and natural causes.

Entanglement in fishing gear poses a threat to individual humpback whales throughout the Pacific. The estimated impact of fisheries on this humpback whale stock is likely underestimated, since the M/SI of large whales due to entanglement in gear may go unobserved because whales swim away with a portion of the net, line, buoys, or pots. Pot and trap fisheries are the most commonly documented source of mortality and serious injury of humpback whales in U.S. west coast waters (Carretta *et al.*, 2014). According to the West Coast Region's Stranding Database (NMFS, 2014), 53 humpback whales were entangled in fishing gear from 1998-2013. During the past five years (2009-2013), a total of 22 were humpback whales (NMFS, West Coast Regional Marine Mammal Stranding Database, 2014). This stock is driving the Category II classification of the following fisheries: the CA halibut/white seabass and other

species set gillnet (>3.5 in mesh); CA spot prawn pot fishery; CA Dungeness crab pot fishery; OR Dungeness crab pot fishery; WA/OR/CA sablefish pot fishery; and the WA coastal Dungeness crab pot/trap fishery (2014 Final List of Fisheries; 79 FR 14418, March 14, 2014).

The deaths of two humpback whales (December 27, 1984) that stranded in the Southern California Bight have been attributed to entanglement in fishing gear (in Carretta *et al.*, 2012, ref Heyning and Lewis, 1990), and a humpback whale was observed off Ventura, California, in 1993, with a 20 foot section of netting wrapped around and trailing behind (Caretta *et al.*, 2006). From 1999-2003, a humpback cow-calf pair was seen entangled in Big Sur, California (1999) and another single humpback was seen entangled in line and fishing buoys off Grover City, California (2000), but the fate of these animals is unknown. In 2003, there were five separate reports of humpback whales entangled in crab pot and/or polypropylene lines. In March 2003, an adult female with a calf was seen off Monterey with crab pot line wrapped around her flukes. An adult humpback was seen in May 2003 in the Santa Barbara Channel with 100 feet of yellow polypropylene line wrapped around its pectoral fins and caudal peduncle. Another adult female with a calf was seen in August 2003, west of the Farallon Islands with crab pot line with floats wrapped around its caudal peduncle and fluke lobe. In November 2003, there were two reports within four days near Crescent City and south of Humboldt Bay, California, of single humpback whales with crab pot line wrapped around their torso. These two reports may be the same whale, but the current disposition of these whales is unknown. In 2004, a humpback was observed swimming with a small amount of white rope, approximately 1/8 inch thick, wrapped around its caudal peduncle. The final status of this animal is unknown. In 2005, three humpback whales were entangled in trap/pot gear. One out of the three free-swimming animals was successfully disentangled. In 2006, seven humpback whales were reported entangled in gear. Six of the animals were free-swimming with gear attached to the body; one animal had numerous sablefish pots trailing. This single humpback whale interaction in 2006 elevated the classification of the WA/OR/CA sablefish pot fishery from a Category III to a Category II fishery. Another one of the six animals was also entangled in sablefish gear, but was successfully disentangled and all the gear was removed. This same year, in Charleston, Oregon, up to two animals stranded dead but are considered to be the same animal in the stranding database and counted as one humpback in this analysis. One animal had been sighted alive, but entangled, and then an animal stranded dead on the beach. In between the first sighting and the beached animal, the USCG attempted to disentangle an animal but was unsuccessful. A dead whale matching the description of the animal that had been unsuccessfully disentangled, stranded dead a little over a week after the disentanglement effort was attempted. According to the stranding database, these two animals could be the same animal and are counted as one here. In 2007, five humpback whales were reported entangled in gear. Four of the animals were free-swimming with gear attached and the other animal was alive and entangled in crab gear, but at the time of the sighting was being attacked and killed by killer whales. It is not clear how entanglement may have played a role in the death of this whale. In 2008, six animals were reported entangled in gear. One of the six was entangled in Dungeness crab pot gear, and although the fisherman's report indicated that he did not think the entanglement was life-threatening, the gear was left attached to the animal (reports indicated that the gear was on/near the chin area of the animal). In the absence of any other information, the final status of this animal is unknown and assumed to be a serious injury for this assessment. The remaining animals were free-swimming with crab pot, unidentified pot/trap gear, or gear from an unidentified net fishery. Two of six animals were reported with

similar type gear attached. The database links these two animals as possibly being the same individual; however, one of the animals was initially sighted in mid-May, positively identified with photo identification, and last seen at the beginning of June. The second animal was reported to be a young animal and was last observed in mid-July near Seiku, Washington. Disentanglement efforts were attempted, but were unsuccessful. Since the original description that accompanied the mid-May animal did not state that it was a young animal and the description that accompanied the photo identification catalogue did not link these animals, they are considered two animals. In addition, when the Seiku animal was observed in mid-July, numerous sightings were reported, but positive identification was confounded due to the presence of several other animals in the area, including gray whales. In 2009, three humpback whales were reported entangled in gear, two stranded dead, and one was a fishermen's self-report from 2009 from the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). In 2010, a total of eight humpback whales were reported entangled in gear. Two were found dead and six were trailing gear. Two of the animals observed entangled in gear from an unidentified fishery may be resights, decreasing the total to 6 animals. However, since the resights were not confirmed, a conservative total of six whales were used. In 2011, three humpback whales were observed entangled in unidentified pot/trap gear and two were entangled in crab pot gear. Also in 2011, four humpback whales were observed alive, but entangled in gear that matches gear typically used by the Washington state recreational crab fishery[9]. In 2012, one humpback whale was entangled in unidentified gear and second one was entangled in unidentified pot/trap gear. No entanglements were reported from the observer program that monitors the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) (Carretta *et al.*, 2014; Carretta and Enriquez, 2006, 2007, 2009a, 2009b, 2012); however, a fisherman's self-report described the entanglement of a humpback whale in 2009. All human interactions recorded in the stranding database involving humpback whales were reviewed by James Carretta from the Southwest Fisheries Science Center (J.V. Carretta, pers. comm., 2014) using the NMFS policy on distinguishing serious from non-serious injuries (NMFS 2012d). Only those that were determined to be either a serious injury or mortality were included in Table 5.

From October 29, 1997, the day before the effective date of the Plan, observers recorded the incidental entanglement of one humpback by the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), in 1994, off southern California. This animal was released alive and uninjured (NMFS, 2000). After the 1997 implementation of the Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) dropped considerably (Barlow and Cameron, 2003). Following the implementation of the Plan, three humpbacks have been observed entangled in this fishery. One humpback was observed taken in 1999, off southern California; this animal was also released alive and uninjured. The net had a full complement of pingers (41) and 36 foot extenders (NMFS, 2000). The other humpback was observed taken in November, 2004, off San Clemente Island, in Southern California waters. The animal was released alive and uninjured; however, the net was not in full compliance with the Plan (NMFS, Observer Program, 2006). Because the humpbacks were released alive without any trailing gear, it is not considered a serious injury or mortality (Angliss and DeMaster, 1998). As noted previously in this section, a self-report was received

[9] http://wdfw.wa.gov/fishing/shellfish/gear_rules.html

from the owner of a fishing vessel in the CA thresher shark/swordfish drift gillnet fishery(≥14 in mesh), reporting an incidental entanglement with a humpback whale off of San Diego, California, in January 2009. The animal was released with trailing gear and, based on the description, is considered a serious injury. The interaction of this animal with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) in 2009, elevated the classification of the fishery from a Category III to a Category II.

In addition to the humpback entanglements, there were 22 unidentified whales observed entangled in pot/trap gear or unknown gillnet gear during 1998-2013. Some of these animals may represent re-sightings of entangled humpback whales described above. It is likely that most of the unidentified pot/trap fishery entanglements involved humpback whales. Other unobserved fisheries may also result in serious injuries or deaths of humpback whales (Carretta *et al*., 2014).

Ship strikes were implicated in the deaths of at least two humpback whales in 1993, one in 1995, and one in 2000 (J. Cordaro, NMFS unpublished data, *in* Carretta *et al*., 2006). In 2004, a humpback whale stranded dead in Washington with injuries consistent with those caused by a vessel collision. In 2005, a free-swimming humpback whale was reported to have been hit by a USCG vessel in San Francisco Bay. No blood was visible in the water, but the final status of this animal remains unknown. In 2007, a humpback whale cow/calf pair swam into the Sacramento River with injuries consistent with a vessel collision. The injuries appeared non-fatal as the animals eventually left the River and headed back into the Pacific Ocean. Also in 2007, a humpback whale stranded dead in Marin County, California, with a fractured skull, consistent with a vessel collision. In 2008, in Washington, two humpback whales stranded dead with injuries consistent with those caused by a vessel collision. In 2011, a humpback whale stranded dead with a large contusion near the dorsal fin, in Los Angeles County, California with injuries consistent with those caused by a vessel collision. In 2013, one humpback whale was killed by a vessel collision and stranded dead in Marin County, California. Additional mortality from ship strikes probably goes unreported because the whales do not strand or, if they do, they do not have obvious signs of trauma. Several humpback whales have been photographed in California with large gashes in their dorsal surface that appear to be from ship strikes (J. Calambokidis, pers. comm., in Carretta *et al.*, 2012). The 5-year average number of humpback whale deaths by ship strikes off the west coast of the U.S. from 2007-2011 as reported in Carretta *et al.* (2014) is 1.1 humpback whales per year. The 5-year average number of humpback whale deaths by ship strikes off the west coast of the U.S. west coast considered in this analysis from 2009-2013 is 0.60 humpback whales per year, but this is considered a minimum since animals struck by ships may not be realized or reported.

10.1.3 Summary of Status - Humpback Whales

Population estimates for humpback whales in the entire North Pacific have increased substantially, from 1,200 animals in 1966 to approximately 18,000 to 20,000 humpback whales in 2004 to 2006 (Calambokidis *et al.*, 2008). Although these estimates are based on different methods and the earlier estimates are extremely uncertain, the growth rate implied by these estimates (6-7%) is consistent with the recently observed growth rate of the CA/OR/WA stock. Despite the apparently low proportion of calves, two independent lines of evidence indicate that this stock was growing in the 1980s and early 1990s (Barlow 1994; Calambokidis *et al.*, 2003)

with a best estimate of 8% growth per year (Calambokidis *et al.*, 1999). The current net productivity rate is unknown. Humpback whales of the North Pacific were estimated to be reduced to 13% of carrying capacity by commercial whaling (Braham, 1991). The initial abundance estimate has never been estimated separately for the CA/OR/WA stock, but shore-based whaling apparently depleted the humpback whale stock off California twice: once prior to 1925 (Clapham *et al.*, 1997) and again between 1956 and 1965 (Rice, 1974). Humpback whales are listed as endangered under the ESA, and consequently the CA/OR/WA stock is considered "depleted" and a "strategic stock" under the MMPA. The increasing levels of anthropogenic noise in the world's oceans have been suggested to be a habitat concern for whales, particularly baleen whales who may communicate using low-frequency sound.

10.2 CA/OR/WA Stock of Sperm Whales

Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead, 1997). They are also protected by CITES. In the U.S., sperm whales were listed as endangered when the ESA was enacted in 1973. Because of this, they are considered depleted and the CA/OR/WA stock is strategic under the MMPA.

10.2.1 Status of the Species - Sperm Whales

Sperm whales are found year-round in California waters (Dohl *et al*., 1983; Barlow, 1995; Forney *et al*., 1995). They reach peak abundance from April through mid-June and from the end of August through mid-November (Rice, 1974). They have been seen in every season except winter (December through February) in Washington and Oregon (Green *et al.*, 1992). A recent survey designed specifically to investigate stock structure and abundance of sperm whales in the northeastern temperate Pacific revealed no apparent hiatus in distribution between the U.S. EEZ off California and areas farther west, out to Hawaii (Barlow and Taylor, 2005).

Previous estimates of sperm whale abundance from 2005 (3,140, CV=0.40, Forney, 2007) and 2008 (300, CV=0.51, Barlow, 2010) show a tenfold difference that cannot be attributed to human-causes or natural population declines and likely reflect a combination of estimation error and movement of animals into and out of the study area. New estimates of sperm whale abundance in California, Oregon, and Washington waters out to 300 nmi are available from a trend-model analysis of line-transect data collected from 1991 through 2008 (Moore and Barlow, in press). Abundance trend models incorporate information from the entire 1991-2008 time series to obtain each annual abundance estimate and provide more precise estimates with less inter-annual variability. The new estimates are from methods similar to those previously used to estimate abundance trends for fin whales (Moore and Barlow, 2011) and beaked whales in the California Current (Moore and Barlow, 2013). Sperm whale abundance estimates based on the trend-model ranged between 2,000 and 3,000 animals for the 1991-2008 time series (Moore and Barlow, in press). The best estimate of sperm whale abundance in the California Current is the trend-based estimate corresponding to the most recent survey (2008), or 1,332 animals (the 20th percentile). Generally, the models provide more precise estimates of abundance than methods used more commonly to generate a stock's abundance estimate. In the case of the CA/OR/WA sperm whale stock, the new analysis includes improved estimates of trackline detection

probability, g(0), because it includes corrections for low-biased group size estimates related to field methods used prior to the 2001 California Current survey cruise. Previously, NMFS estimated abundance for this stock based on the geometric mean of the most recent surveys in 2005 and 2008. This resulted in a population abundance estimate of 971 (CV = 0.31) sperm whales. The approach was based on the agency's intent to achieve a population abundance estimate with CV of less than or equal to 0.3. The 2008 survey estimates were the lowest to date and more likely a reflection of interannual variability in the distribution of the stock than a decline in the abundance of the stock. Moore and Barlow (in press) report that the abundance of sperm whales appeared stable from 1991 to 2008, but that any reliable conclusions on trends could not be made for the whole population because the precision of estimated growth rates was poor. However, they also reported that trends in the detection of single animals (presumably large, solitary males) apparently doubled over this time period. The authors could not determine if the apparent increase in sightings of single animals reflected an increase in the number of adult male sperm whales in the population or merely increased use of the U.S. west coast by adult males in recent years.

In recognition of this variability and in response to a recommendation made by the Team at its February 2014 meeting, Moore and Barlow (in press) use a Bayesian hierarchical trend model to make more efficient use of all information contained in a time series for the CA/OR/WA sperm whale stock, where this approach reduces the variability in reported population estimates based on interannual variations in species presence and other sources of error in observational survey data. In using a Bayesian approach to model all sources of uncertainty, and taking into account any available information, a probability is assigned a quantity (this is done for the purpose of representing the state of knowledge for whatever it is that is being modeled [sperm whales, fishing, sighting conditions, etc.]) and that probability is assigned to the hypothesis that is being tested (i.e., to evaluate the probability of the hypothesis rather than just testing the hypothesis). Studies in terrestrial systems first demonstrated the value of using Bayesian hierarchical analyses to improve abundance trend inference by making efficient use of information contained within a time series of replicate-survey or capture-recapture data and was extended to the fin whale (Moore and Barlow, 2011) and beaked whale (Moore and Barlow, 2013). The problem of small samples from individual surveys can sometimes be overcome by building up a larger sample over the course of multiple surveys, since all the observations provide information about the same Markovian demographic processes that inform population growth rate. Group size is highly variable for sperm whales and can greatly influence individual year estimates. Thus, abundance survey data from one year provide a certain amount of information about population abundance in other years. Rather than considering survey years as a single stratum to estimate the abundance of sperm whales, as was previously done, this new method pools data collected across multiple years from 2001-2012 (Moore and Barlow, in press) and considers the survey strata from across those years as one large survey area. The new g(0) estimates and the new abundance trend analysis are currently in peer-review, at the time of the release of this document, with the journals *Marine Mammal Science* and *Endangered Species Research*, respectively. Both have received a favorable first-round of reviews.

Under the MMPA, the PBR is defined as the product of the minimum population estimate, one half the maximum theoretical net productivity rate, and a recovery factor (Fr): PBR= N_{min} x $0.5R_{max}$ x Fr (0.1). The minimum population estimate for sperm whales is taken as the lower

20th percentile of the posterior distribution of abundance estimated from 2008 or 1,332 whales (Moore and Barlow, in press). The PBR level for this stock is calculated as the minimum population size (1,332) times one half the default maximum net growth rate for cetaceans (½ of 4%) times a recovery factor of 0.1 (for an endangered stock with N_{min} <1,500; Taylor *et al*., 2003), resulting in a PBR of 2.7 sperm whales per year.

10.2.2 Threats - Sperm Whales

Here we provide a brief summary of the threats to sperm whales as they are applicable to the negligible impact determination, but more detailed information can be found in the Sperm Whale Recovery Plan (available at: http://www.nmfs.noaa.gov/pr/pdfs/recovery/final_sperm_whale_recovery_plan_21dec.pdf) and the SARs (available at http://www.nmfs.noaa.gov/pr/sars/). Threats to sperm whales include fishery interactions, vessel disturbance, illegal whaling or resumed legal whaling, reduced prey abundance due to overfishing or other factors (including climate change), habitat degradation, disturbance from noise, disease, pollution, impacts related to research, and natural causes.

Entanglement in fishing gear poses a threat to individual sperm whales and overall to the CA/OR/WA sperm whale stock. Prior to the implementation of the Plan on October 30, 1997, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) was observed to incidentally take seven sperm whales; of these whales, three were dead (43%), three were released alive and uninjured (43%), and one was released injured and was not expected to survive (14%). More specifically in 1992 the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) was observed taking three sperm whales in one set off central California; two were alive and released uninjured, and one was dead. In 1993, two sperm whales were entangled in one set off southern California; one was alive and released uninjured, and one was dead. Also in 1993, one sperm whale was observed entangled and subsequently died in a drift gillnet off central California. In 1996, one sperm whale was observed entangled and released injured (trailing gear, and wounded from ramming the vessel) off central California.

After the 1997 implementation of the Plan, overall cetacean entanglement rates in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) dropped considerably (Barlow and Cameron, 2003), and only one sperm whale was observed incidentally taken in 1998. This animal died in a net off central California that did not have the full complement of pingers. However, because sperm whale entanglements are rare and because the net that took the sperm whale did not use the full mandated complement of pingers, it is difficult to evaluate whether pingers are having an effect on sperm whale entanglement. Pingers emit pulsed tones with source levels of 135 dB RMS; re: 1 μPa @ 1 m, fundamental operating frequencies of 10-12 kHz (with harmonics to 80 kHz), a pulse duration of 300 ms, and a pulse interval of 4 s, which is within the hearing range of sperm whales. The Team and Pacific Scientific Review Group both recommended no further strategies to reduce sperm whale entanglement, until the effectiveness of pingers is better understood. In late 2010, an observer recorded two sperm whales entangled in one net (with a full complement of pingers) in the CA thresher shark/swordfish drift gillnet fishery(≥14 in mesh). One animal was found dead and the other was released alive, but seriously injured with gear attached. The whales were likely taken from the CA/OR/WA stock of sperm whales. Because those sperm whales were observed by NMFS' federal observers, the numbers

of animals that interacted with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) are extrapolated by the percent observer coverage for that year. Thus, in 1998, the observer coverage was 20% and the one observed animal is extrapolated to a total of five animals for that year. Similarly, in 2010, the two animals that interacted with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) were observed at an observer coverage rate of 11.9%, resulting in an extrapolated value of 16 total animals for that year (see Table 5).
With regard to other known fisheries interactions, one sperm whale was found dead in Marin County, California in 2004, with monofilament netting in its stomach (West Coast Regional Stranding Database, 2014). It is not known if this marine debris was the cause of death, however. Similar to 2004, in 2008, two sperm whales stranded dead: one was found in Crescent City, CA with a stomach full of a variety of different nets and the other in Point Reyes, CA with a variety of different netting, a plastic tarp, and rope marks on its pectoral flipper. Also, in 2008, an animal stranded dead in North Cove, Washington with apparent entanglement scars. Although it is not known if any of the animals' primary cause of death from 2008 was caused by interactions with gear, conservatively, they are included in this determination. Ship strikes were implicated in the deaths of at least four sperm whales in 2001, one in 2002, one in 2007, and one in 2009 (West Coast Regional Stranding Database, 2014). The 13-year average number of sperm whale deaths by ship strikes off the west coast of the U.S. west coast considered in this analysis from 2001-2013 is 0.23 sperm whales, but this is considered a minimum since animals struck by ships may not be realized or reported. All human interactions recorded in the stranding database involving sperm whales were reviewed by the Southwest Fisheries Science Center (J.V. Carretta, pers. comm., 2014) using the NMFS policy for distinguishing serious from non-serious injuries (NMFS 2012d) to evaluate mortality or serious injury. Only those that were determined to be either a serious injury or mortality were included in Table 5.

10.2.3 Summary of Status - Sperm Whales

Large populations of sperm whales exist in waters that are within several thousand miles west and south of California, Oregon, and Washington. However, there is no evidence of sperm whale movements into these regions from either the west of south and genetic data suggest that mixing to the west is unlikely. There is limited evidence of sperm whale movement from California to northern areas off British Columbia, but there are no abundance estimates for this area. Current and historic estimates for the abundance of sperm whales in the North Pacific are considered unreliable (Allen and Angliss, 2014). The abundance of sperm whales in the North Pacific was reported to be 1,260,000 prior to exploitation, which by the late 1970s was estimated to have been reduced to 930,000 whales (Rice, 1989). These estimates include whales from the California/Oregon/Washington stock. The CA/OR/WA sperm whale stock is not considered to be declining (Carretta *et al.*, 2014).

11.0 Interaction with Category I and II Fisheries in California, Oregon, and Washington

Process for Distinguishing Serious from Non-Serious Injuries

The MMPA requires NMFS to estimate annual levels of human-caused M/SI to marine mammal stocks (section 117) and to categorize commercial fisheries based on their level of incidental mortality and serious injury of marine mammals (section 118). NMFS convened a workshop in

2007 to review performance under existing guidance, gather current scientific information, and update guidance based on the best available information and, based on results of the 2007 workshop, recommendations for national guidance were developed (Andersen *et al.*, 2008). These recommendations and results from new analysis of existing NMFS data were incorporated into a Policy Directive and accompanying Procedural Directive (NMFS, 2012d), which currently serves as the basis for analyzing injury reports (e.g., observer, disentanglement, and stranding program reports) of marine mammals and incorporating the results into SARs and marine mammal conservation management regimes (*e.g.*, LOF, Take Reduction Teams, Take Reduction Plans, ship speed regulations, and negligible impact determinations). For the purposes of this analysis, the Andersen *et al.* 2008 and Andersen 2012 guidelines were both used to evaluate human-caused injuries, and distinguish an injury as either "serious" or "non-serious." The Andersen 2012 guidelines went into effect in 2012, and were first applied to the 2013 SARs. In using the Andersen 2012 guidelines to conduct an evaluation of serious injury determinations from the most recent 5-yr time period (and depending on the serious injury itself), certain large whale serious injury determinations evaluated in this analysis may be prorated beginning with the final 2013 SARs (*e.g.*, a serious injury may be recorded as 0.75 of an animal rather than 1.0). Conservatively, for the purposes of this analysis for the negligible impact determination, if an injury was determined to be a serious injury for the CA/OR/WA humpback whale or sperm whale stocks, it was recorded in Table 5 as a whole number (*e.g.*, 1) and not prorated.

This section evaluates the available information to determine the likelihood of a humpback or sperm whale interacting with various commercial fisheries off California, Oregon, and Washington. Of all the Category I and II fisheries, as currently listed in the Final 2014 List of Fisheries (79 FR 14418; March 14, 2014), listed marine mammal species under NMFS' jurisdiction have been observed taken in the following two federally managed fisheries the CA thresher shark/swordfish drift gillnet ($\geq$ 14 in mesh) and the WA/OR/CA sablefish pot fisheries. Information available for this analysis includes reports of interactions between the fishery and humpback and sperm whales, derived from observer programs, logbooks, and reports (*e.g.*, reported entanglements, fisher self-reports, etc.). Additional mortality and serious injury have been documented through stranding reports. In cases where the specific fishery that caused the serious injury or mortality cannot be definitively identified, the serious injury or mortality has been attributed to "unknown fishery." Serious injury or mortality is not used to categorize fisheries under the annual LOF, but are included in this analysis to determine whether all commercial U.S. fisheries collectively have a negligible impact on the stocks. All human interactions recorded in the stranding database involving humpback or sperm whales were reviewed by James Carretta from the Southwest Fisheries Science Center (J.V. Carretta, pers. comm., 2014) using the Andersen *et al.* (2008; 2012) criteria to determine a mortality or serious injury. Only those that were determined to be either a serious injury or mortality were included in Table 5.

Impacts of CA thresher shark/swordfish drift gillnet fishery ($\geq$14 in mesh)

In the CA thresher shark/swordfish drift gillnet fishery($\geq$14 in mesh), a wide variety of marine mammals are seriously injured or killed, which is most likely attributable to the non-selectivity of gear and location of fishing effort. The probability that a marine mammal will initially survive an entanglement in fishing gear depends largely on the nature of the interaction (*e.g.*,

location of entanglement on body, amount of gear, whether feeding or locomotion is impaired, etc.), species, size, age, and health of the marine mammal involved. For instance, larger animals such as humpback whales may become entangled in gillnet but often survive the initial contact with the gear. Such entanglement may cause considerable damage to the gear, as the large whales may "punch" through and continue swimming. The degree of gear damage may be related to the type of net used, however, as fishermen do report that large blue and fin whales usually break through drift gillnets without entangling and that very little damage is done to the net (Barlow *et al*., 1997).

Marine mammals that die as a result of entanglement in drift gillnets usually drown. If entangled in a net with a typical soak time of 12-14 hours and suspended at least 36 feet from the surface, the animal is unable to survive without oxygen, especially if it is entangled at the beginning of the set, or in a deep section of the net. Marine mammals may also be affected as a result of being captured in a drift gillnet such as a sustained stress response, caused by repeated or prolonged entanglement in gear, may reduce fitness and make marine mammals more vulnerable to infection, disease, and predation (Angliss and DeMaster, 1998).

In the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), observers record detailed information on marine mammals entangled in the net. Animals that are released alive from the net with netting attached are classified as "injured." Animals that completely release themselves or are completely released from the net by fishermen and can swim normally are recorded as "alive." Based on the recent disentanglement efforts, the condition of the animal at the time of disentanglement likely predicts its future (*e.g.*, a skinny, weak animal is more likely to perish than an animal with less gear and swimming strongly). Seriousness of injuries was assessed under the MMPA serious injury guidelines (Angliss and DeMaster, 1998; NMFS, 2012d). Because long-term stress studies have not been conducted on the impacts of capture by a fishery on marine mammals, NMFS is only able to make assumptions on the condition of marine mammals that have been released "unharmed" from a drift gillnet. Although marine mammals released "unharmed" do not have visible injuries, they may have been stressed from being caught or entangled in a net. This stress may cause an interruption in essential feeding behaviors or migration patterns; however, NMFS considers this effect, if experienced, is likely to be temporary and short-term, unless there are indications that the animal is or has been compromised. For these reasons, without long-term studies on a whale's behavior following an entanglement, NMFS assumes that most of the marine mammals released and reported as "unharmed," or "uninjured," recover fully and survive following their capture in a drift gillnet, and that latent effects are limited to short-term physiological stress or short-term interruption of normal behavioral patterns.

Survival rate likely varies among marine mammal species incidentally taken by the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). This is due in part to variations in size and diving and foraging behavior, as well as location in the net and time of entanglement. With few observed marine mammal entanglements in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), it is difficult to speculate as to the survival rate of the three listed species observed taken in the fishery. However, because baleen whales (humpback) and sperm whales differ so greatly in the nature of their preferred prey and foraging behavior, as well as their physiology (e.g., the sperm whale is capable of diving to much greater depths than the baleen

whales in order to find their preferred prey of squid, depending largely on oxygen storage and metabolism, while the baleen whales rely less on diving, if possible, and tend to skim and gulp for euphausiids at the surface or below), survival rates following gillnet entanglement most likely vary greatly as well.

Since 1998, of the two species of whale analyzed, one humpback (self-report) and three sperm whales (observed) were observed/reported as entangled in the CA thresher shark/swordfish drift gillnet gear. An additional seven animals were observed/reported in unknown net gear (6 humpback whales and 1 sperm whale) and 2 humpback whales in gillnet gear. From 1998-2013, 12 humpback whales were assumed seriously injured or killed in an unidentified or unknown fishery (Carretta *et al.*, 2012; the NMFS West Coast Regional Marine Mammal Stranding Database, 2014) (Table 5).

Impacts of WA/OR/CA sablefish pot fishery

Only one humpback whale was confirmed seriously injured or killed in the WA/OR/CA sablefish pot fishery. In 2012 observer coverage for this fishery averaged about 73% (Marlene Bellman, NWFSC, pers. comm., 2014). From 1998-2013, one fin whale was killed and two other fin whales were assumed seriously injured or killed in an unidentified fishery (Table 5). In addition, twelve humpback whales were assumed seriously injured or killed in an unidentified or unknown fishery (Table 5). In addition, there were 22 unidentified whales observed entangled in pot/trap gear or unknown gillnet gear during 1998-2013 (NMFS, West Coast Regional Marine Mammal Stranding Database, 2014). Some of these animals may represent re-sightings of those described above. It is likely that most of the unidentified pot/trap fishery entanglements involved humpback whales.

12.0 Negligible Impact Analysis

12.1 Incidental Takes in Commercial Fisheries

The mortality and serious injury (M/SI) of sperm and humpback whales incidental to state and federal commercial fisheries are summarized by year in Table 5. In Table 5, the M/SI from fisheries is described as either (1) "Observed fishery M/SI (observer coverage rate)," which indicates those records that were observed by a NMFS federal observer and the corresponding observer coverage rate provided in the parentheses; (2) "Extrapolated[10] takes from observed M/SI" provides the extrapolated value from the observed serious injury or mortality multiplied by the observer coverage rate; (3) "Other reported fishery M/SI" represents any other fishery-related serious injury or mortality that was not observed or reported by a NMFS federal observer; and, (4) "Non-fishery human-caused M/SI (source)" indicative of any record of a non-fishery serious injury or mortality with the source of that serious injury or mortality included in

[10] Extrapolation is only possible when a mortality or serious injury is observed by a NMFS federal observer and the mortality or serious injury is multiplied by the observer coverage rate for that year. Other fishery-related mortality and serious injury is reported in Table 5 as "non-extrapolated" because there is no corresponding observer coverage. The mortality and serious injury cannot be extrapolated, since there is no observer coverage rate for that fishery-related mortality or serious injury.

parentheses. In Table 5, we also provide the minimum fishery M/SI and minimum total M/SI from all human-caused sources which are additive, and both include the observed (by NMFS federal observer) extrapolated fishery-related M/SI and the other fishery-related (non-extrapolated) records of M/SI.

We considered two time frames for this analysis: 5 years (2009-2013) and 13 years (2001-2013). The first time frame we considered for both stocks of whales was the most recent five-year period (here, January 1, 2009 through December 31, 2013) and is typically used for negligible impact determination analyses. A five-year time frame provides enough data to adequately capture year-to-year variations in take levels while reflecting current environmental and fishing conditions as they may change over time. However, NMFS' Guidelines for Assessing Marine Mammal Stocks (GAMMS) suggest that mortality estimates could be averaged over as many years as necessary to achieve a Coefficient of Variation (CV) of less than or equal to 0.3. Caretta and Moore (2014) recommend pooling longer time series of data particularly when bycatch is a rare event[1]. For example, pooling 10 years of fishery data resulted in bycatch estimates within 25% of the true bycatch rate over 50% of the time (estimates were within 25% of the true value more often than not). Key to this approach, however, was that the underlying pooled fishery data reflected a fishery with sufficiently constant characteristics (effort, gear, locations, etc.,) to pool the data, such as with the CA thresher shark/swordfish drift gillnet fishery ($\geq$14 in mesh). Rare bycatch events typically involve smaller populations paired with low observer coverage for that fishery. If true bycatch mortality is low, but near PBR, then estimation bias needs to be reduced to allow reliable evaluation of the bycatch estimate against a low removal threshold.

In marine mammal stock assessments, NMFS utilizes a strategy of pooling bycatch estimates across multiple years to account for interannual variability in observer coverage, cetacean abundance and distribution, oceanography, and fishing practices. Annual estimates of bycatch are typically pooled across 5-year periods to calculate mean annual mortality levels (NMFS, 2005; Moore and Merrick, 2011), although guidelines for the preparation of stock assessment reports (NMFS, 2005) allow for other pooling periods to be used: "It is suggested that mortality estimates could be averaged over as many years necessary to achieve a CV of less than or equal to 0.3, but should usually not be averaged over a time period of more than the most recent 5 years for which data have been analyzed. However, information that is more than 5 years old should not be ignored if it is the most appropriate information available in a particular case" (NMFS, 2005). Currently, the CA/OR/WA sperm whale stock is the only ESA-listed marine mammal species with a relatively low minimum population estimate (N_{min}) that has recently been recorded by NMFS Federal observers as having been killed or seriously injured in the CA thresher shark/swordfish drift gillnet fishery ($\geq$ 14 in mesh). However, fishery interactions with the CA/OR/WA stock of sperm whales are still considered a rare event. Moore and Barlow (in press) used a Bayesian hierarchical trend model to more efficiently incorporate available survey information, to calculate the population abundance estimate by using a larger time series to improve the precision of abundance estimates. The post-2000 time period best represents the current spatial state of the fishery and is used to calculate mean annual bycatch estimate for sperm whales, based on recommendations contained in the GAMMS and Carretta and Moore (2014). Therefore, the corresponding time frame was used to estimate the CA/OR/WA stock of sperm whale abundance.

While fishery interactions with the CA/OR/WA stock of humpback whales are also considered rare events, we used the 5-year time frame for estimating bycatch of this stock because applying a longer time series has not yet been conducted for this stock. In the future, using a longer time series of bycatch data may be applied to other rarely caught marine mammal species, such as the humpback whale, but this analysis has not been conducted to date.
In Appendix 3 we provide an evaluation of mortality and serious injury from all sources for three possible time frames for both species considered in this analysis (5-year (2009-2013), 13-year (2001-2013), and 16-year (1998-2013)) even though not all of those time frames were used in the negligible impact determination for each species and the application of a longer time frame for humpbacks has not been applied, for the reasons provided above (*i.e.*, not peer reviewed or published to date). For CA/OR/WA sperm whale stock, in particular, the negligible impact determination issued in September 2013, used the PBR current at that time of 1.5 animals and a 5-year time frame, and because measures to reduce bycatch of sperm whales were in place, a negligible impact determination could be made. Since then, the PBR has been revised and in this analysis we use a PBR of 2.7 sperm whales and the 13-year time frame as explained above. To offer the reader a comprehensive review of the most recent PBR for sperm whales and the application of the negligible impact determination criterion, we provide in Appendix 4, a comparison using a PBR of 1.5 and a PBR of 2.7 animals across each time frame. Even though we provide this comparison, a PBR of 2.7 animals is the only PBR level used to make the negligible impact determination here.

Data sources for mortality and serious injury incidental to commercial fishing operations include observer data and stranded or entangled whales reported to NMFS through various sources. Seriousness of injuries was assessed using guidelines developed for marine mammal stock assessments under the MMPA (Angliss and DeMaster, 1998; Andersen *et al.*, 2008; NMFS, 2012d). This estimate is considered a minimum because not all entangled animals die immediately and not all dead animals are found, reported, or cause of death determined.

A conservative approach is taken in these analyses for evaluating the negligible impact of fisheries and other sources, such as ship strikes, on these stocks, so in certain cases, the maximum number of serious injuries and mortality was used for the calculations. For example, if a ship strike occurred, but serious injury or mortality was not observed on scene or confirmed by necropsy of the stranded animal, and if further review of reports and other sources confirmed serious injury or mortality, it was assumed for purposes of this analysis that serious injury or mortality occurred. A summary of percentages representing ratios of serious injuries and mortality relative to PBR are provided in Tables 6 and 7.

Fishery Mortality and Serious Injury

From 2009 through 2013, all known M/SI incidental to commercial fishing operations is 22 humpback whales, resulting in an annual average take of 4.4 animals. The current PBR calculated for this stock is 11.0 animals. Therefore, the 5-year (2009-2013) average M/SI of humpback whales in commercial fisheries is 38.90% of the current PBR.

From 2001 through 2013, the total of all M/SI due to commercial fishing operations is 20 sperm whales, resulting in an annual average take of 1.53 animals. The overall PBR calculated for this

stock is 2.7 animals. Therefore, the 13-year (2001-2013) average incidental take in commercial fisheries is 57.00% of the PBR.

12.2 Ship Strike Mortality and Serious Injury

The same 5-year and 13-year time frames used above for commercial fisheries were also used to analyze other human-caused M/SI. Under the ship strike descriptions in Table 5, either (1) the ship strike was the confirmed cause of serious injury and/or mortality from direct observation from the ship or from the necropsy; or (2) the ship strike is assumed to be the cause of serious injury and/or mortality based on the report that accompanied the event (*e.g.*, ship captain observed blood in the water). In Appendix 3 we do provide our evaluation of mortality and serious injury from all sources for all possible time frames for both species considered in this analysis (5-year, 13-year, and 16-year) even though not all of those time frames were used in the negligible impact determination for each species.

From 2009-2013, the total number of observed or assumed M/SI attributed to ship strikes is 3, resulting in an annual average of 0.60 humpback whales. Therefore, the incidental take by ship strikes is 5.45% of PBR. No other sources of direct HCM/SI are known to affect the CA/OR/WA stock of humpback whales.

From 2001-2013, the total number of observed or assumed M/SI attributed to ship strikes is 3.0, resulting in an annual average of 0.23 sperm whales. Therefore, the 13-year (2001-2013) average incidental take by ship strikes is 8.50% of PBR. No other sources of direct HCM/SI are known to affect the CA/OR/WA stock of sperm whales.

12.3 Total Human-Caused Mortality and Serious Injury

The 5-year (2009-2013) average annual HCM/SI, including ship strikes and incidental to all commercial fishing is 5.0 or 45.45% of the PBR for the CA/OR/WA humpback whale stock (Table 5, 6, and 7). The 13-year (2001-2013) average annual HCM/SI, including ship strikes and incidental to all commercial fishing is 1.7 or 65.50% of the PBR for the CA/OR/WA sperm whale stock (Tables 5, 6, and 7).

Table 5. Mortality and Serious Injury Incidental to Commercial Fisheries and Ship Strikes for CA/OR/WA humpback whales (2009-2013) and sperm whales (2001-2013)

Humpback Whale

Year	Fishery	Observed fishery M/SI (observer coverage rate)	Extrapolated takes from observed M/SI	Other reported fishery M/SI	Non-fishery human caused M/SI (source)	Minimum fishery M/SI (includes extrapolated values)	Minimum total M/SI (includes extrapolated values)	PBR for that year
2009	CA drift gillnet			1(self-report)		3	3	2.5
	Unidentified			1				
	Unidentified net			1				
2010	Unidentified			3	1(ship strike)	8	9	11.3
	Crab pot			5				
2011	Unidentified pot/trap			3	1(ship strike)	9	10	
	Crab pot			2				
	WA recreational crab			4				
2012	Unidentified			1		2	2	
	Unidentified pot/trap			1				
2013					1 (ship strike)		1	
Total 2009-2013					3	22	25	
Average 2009-2013					0.6	4.4	5.0	
Ratio of 5-year Average to Most Recent PBR (PBR=11.0)					5.45%	**40.00%**	**45.45%**	

Sperm Whale

Year	Fishery	Observed fishery M/SI (observer coverage rate)	Extrapolated takes from observed M/SI	Other reported fishery M/SI	Non-fishery human caused M/SI (source)	Minimum fishery M/SI (includes extrapolated values)	Minimum total M/SI (includes extrapolated values)	PBR for that year
2001								2.1
2002					1(ship strike)		1	
2003								1.8
2004	Unknown net			1*		1	1	
2005								
2006								
2007					1(ship strike)		1	3.4
2008				3**		3	3	9.3
2009					1(ship strike)			
2010	CA drift gillnet	2 (11.9%)	16			16	16	1.5
2011								
2012								
2013								2.7
Total 2001-2013					3	20	23	
Average 2001-2013					0.23	1.53	1.7	
Ratio of 13-year Average to Most Recent PBR (PBR=2.7)					8.50%	**57.00%**	**65.50%**	

* Net did not have a full complement of pingers
** Monofilament netting found in stomach

Table 6. Percentages representing the ratio of average annual HCM/SI relative to PBR.

HUMPBACK WHALE CURRENT PBR=11.0	
FISHING: 5-year for Humpback whale from 2009-2013 = 40.00%	5-year fishing and ship strikes Total=45.45% of PBR
SHIP STRIKE: 5-year for Humpback whale from 2009-2013 =5.45%	
SPERM WHALE* CURRENT PBR=2.7	
FISHING: 13-year for Sperm whale from 2001-2013 = 57.00%	13-year fishing and ship strikes Total= 65.50% of PBR
SHIP STRIKE: 13-year for Sperm whale from 2001-2013 = 8.50%	

* The fishing totals for sperm whales include those animals that stranded with netting/fishing gear in their stomachs. It is not clear how the ingestion occurred (i.e., whether they were interacting with fishing or ingested ghost nets); however, the amount of gear in the stomach was determined to be the cause of death. In the previous NID, we included ingestion of gear under fisheries takes, so we continue this practice to be consistent until more is known.

Table 7. Minimum all HCM/SI and all fisheries-related serious injury or mortality used in the negligible impact analysis.

Humpback Whales	Current PBR	All HCM/SI	All HCM/SI annual average	All HCM/SI as a % of PBR	All Fisheries M/SI	All Fisheries M/SI annual average	All Fisheries M/SI % of PBR
5-year	11.3	25	5.0	45.45%	22	4.4	40.00%

Sperm Whales	Current PBR	All HCM/SI	All HCM/SI annual average	All HCM/SI as a % of PBR	All Fisheries M/SI	All Fisheries M/SI annual average	All Fisheries M/SI % of PBR
13-year	2.7	21	1.7	65.50%	20	1.53	57.00%

13.0 Application of Negligible Impact Determination Criteria

In applying the 1999 criteria (see Section 2.1.2 for a description of these criteria) to determine whether mortality and serious injury incidental to commercial fisheries will have a negligible impact on a listed marine mammal stock, Criterion 1 (total human-caused M/SI are less than 10% of PBR) is the starting point for analysis. If this criterion is satisfied, the analysis would be concluded. The remaining criteria describe alternatives under certain conditions, such as fishery mortality below the negligible threshold but other human-caused mortality above the threshold or fishery and other human-caused mortality between the negligible threshold and PBR for a stock that is increasing or stable. If Criterion 1 is not satisfied, NMFS may use one of the other criteria as appropriate. We include a 13-year annual average M/SI for the sperm whale stock (see Section 12.1), and we use the 5-year annual average for the humpback whale stock for the negligible impact determination analysis and the application of the appropriate criterion.

Criterion 1

In this analysis, Criterion 1 was not satisfied for either stock. The total HCM/SI for the CA/OR/WA stocks of humpback and sperm whale, are **not** less than 10% of PBR. The 5-year average annual HCM/SI to the CA/OR/WA stock of humpback whales from all human sources is 5.0 or 45.45% of the current PBR. The 13-year average annual HCM/SI to the CA/OR/WA stock of sperm whales from all human sources is 1.70 or 65.50% of the current PBR. As a result, the other criteria must be examined for the CA/OR/WA humpback and sperm whale stocks (see Tables 7 and 8).

Criterion 2

Criterion 2 is satisfied if total known, assumed, or extrapolated HCM/SI are greater than PBR, and fisheries-related mortality is less than 10% of PBR.

Examining Criterion 2 with respect to the CA/OR/WA stock of humpback whales, total known or assumed HCM/SI (5-year annual average of 5.0) is **not** greater than PBR (of 11.0). The 5-year annual average fisheries-related M/SI is 4.4 or 40.00% of the PBR. Fisheries-related mortality is **not** less than 10% of PBR for either time period considered. In the case of the CA/OR/WA stocks of humpback whales Criterion 2 is not satisfied (see Tables 7 and 8).

Examining Criterion 2 with respect to the CA/OR/WA stock of sperm whales, total human-caused M/SI (13-year annual average of 1.7) is **not** greater than PBR (of 2.7). The 13-year annual average fisheries-related M/SI is 1.53 or 57.00% of the PBR. Fisheries-related mortality is **not** less than 10% of PBR for either time period considered. In the case of the CA/OR/WA stocks of sperm whales Criterion 2 is not satisfied. As a result, the other criteria must be examined for the CA/OR/WA humpback and sperm whale stocks (see Tables 7 and 8).

Criterion 3

In considering the appropriate criterion to use for determining whether commercial fisheries off the U.S. west coast are having a negligible impact on the CA/OR/WA stocks of humpback whales and sperm whales, Criterion 3 (total fishery-related known or extrapolated M/SI is greater than 10% of PBR and less than PBR, and population is stable or increasing) was determined to be the appropriate criterion. For these stocks, the total known or extrapolated fisheries-related M/SI is greater than 10% of PBR and less than PBR, and the populations of these stocks are considered to be stable or increasing. Therefore, U.S. commercial fisheries within the range of the CA/OR/WA humpback and sperm whale stocks, may be permitted subject to their individual review and the certainty of relevant data, and provided that the other provisions of section 101(a)(5)(E) are met. Criterion 3 is the appropriate criterion to analyze these two stocks (see Tables 7 and 8).

Explanation of Negligible Impact Analysis for Humpback Whales

The 5-year annual average M/SI to the CA/OR/WA stock of humpback whales from all human-caused sources, including commercial fisheries (4.4 animals) plus ship strikes (0.6 animals), is 5.0 animals, which is 45.45% of this stock's PBR (above the 10% of PBR threshold, but below PBR). In addition, the population for this stock is considered to be increasing by 8% per year (Carretta *et al.*, 2014). Based on the above, the conditions have been met for applying Criterion 3 (see Table 8) to the analysis of impacts to humpbacks.

Even with the current levels of HCM/SI, the fishery-related M/SI from all commercial fisheries is conservatively estimated at 40.00% (5-year average). However, a total of two humpback whales were observed, estimated or assumed to have either been killed or injured in the two fisheries considered in this authorization, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and WA/OR/CA sablefish pot fishery. This is considered a small portion of the stock's PBR, which is calculated using a recovery factor of 0.3 (would not delay recovery by more than 25%). The minimum population size is about 1,855 and is growing at a rate of about 8% per year. Accordingly, Criterion 3 is satisfied in determining that mortality and serious injury of the CA/OR/WA humpback whale stock incidental to commercial fishing would have a negligible impact on the stock because of individual review of data regarding the stock, including increased growth rate of the stock, limited increases in mortality and serious injury due to the relevant fisheries, and the level of HCM/SI is below the estimated PBR.

Although several humpback whales were entangled in recent years in crab pot gear and in unknown pot/net fisheries in California, the total fisheries-related M/SI for both the 5-year annual average is more than 10% of PBR, but less than this stock's PBR. Since the beginning of the NMFS observer program in 1990, no deaths of humpback whales have been attributed to the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and after the implementation of the Plan, overall cetacean entanglement rates in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) dropped considerably. However, in 2009 a humpback whale was reported seriously injured after interacting with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and in 2006 one humpback whale was considered seriously injured/killed after

interacting with the WA/OR/CA sablefish pot fishery. Fisheries that use pot and trap gear have a history of causing death and serious injury of this stock as noted in the recent listing of pot/trap fisheries as Category II fisheries in the most recent List of Fisheries 2014 (CA spot prawn pot fishery; CA Dungeness crab pot fishery; OR Dungeness crab pot fishery; WA/OR/CA sablefish pot fishery; WA coastal Dungeness crab pot/trap fishery). A total of two humpback whales were either estimated or assumed to have either been killed or injured in the two fisheries considered in this authorization, the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) and WA/OR/CA sablefish pot fishery, indicating that the likelihood that a humpback whale would be taken by these fisheries is very low. Given this low likelihood and in analyzing impacts of commercial fisheries, with consideration of other human-caused impacts and an increasing trend in this stock, Criterion 3 has been met (Table 8); and, therefore, NMFS determines that mortality and serious injury incidental to commercial fisheries will have a negligible impact on the CA/OR/WA stock of humpback whales.

Explanation of Negligible Impact Analysis for Sperm Whales

The 13-year annual average M/SI to the CA/OR/WA stock of sperm whales from all human-caused sources, including commercial fisheries (1.53 animals) plus ship strikes (0.23 animals), is 1.70 animals, which is 65.50% of this stock's PBR (above the 10% of PBR threshold and below PBR).

The 13-year fishery-related M/SI from all commercial fisheries is conservatively estimated at 65.50% of PBR. Since the implementation of the Plan, three sperm whales have been incidentally taken. One in1998 was taken prior to the 2001 closure off central California/southern Oregon in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh), but the net did not have a full complement of pingers; therefore, it is difficult to evaluate whether pingers have an effect on sperm whale entanglement. However, pingers have been shown to have a positive effect on other odontocetes *(i.e*., lower entanglement rates) (Barlow and Cameron 2003). Two more sperm whales were taken in 2010 (one killed; one released seriously injured) in the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) in a compliant net with a full complement of pingers. In 1998, the observer coverage was 20% and the one observed animal is extrapolated to a total of 5 animals over five years (see Appendix 3, Table A3.1, A3.2, A3.3). Similarly, in 2010, the two animals that interacted with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) were observed at an observer coverage rate of 11.9%, resulting in an extrapolated value of 16 total animals over five years (see Table 5). No sperm whales have interacted with the WA/OR/CA sablefish pot fishery. Previous estimates of sperm whale abundance from 2005 (3,140, CV=0.40, Forney, 2007) and 2008 (300, CV=0.51, Barlow, 2010) show a tenfold difference that cannot be attributed to human-caused or natural population declines and likely reflect a combination of estimation error and movement of animals into and out of the study area. New estimates of sperm whale abundance in California, Oregon, and Washington waters out to 300 nmi are available from a trend-model analysis of line-transect data collected from 1991 through 2008 (Moore and Barlow, in press). Abundance trend models incorporate information from the entire 1991-2008 time series to obtain each annual abundance estimate and provide more precise estimates with less inter-annual variability. The new estimates are from methods similar to those previously used to estimate abundance trends

for fin whales (Moore and Barlow, 2011) and beaked whales in the California Current (Moore and Barlow, 2013). Sperm whale abundance estimates based on the trend-model ranged between 2,000 and 3,000 animals for the 1991-2008 time series (Moore and Barlow, in press). The best estimate of sperm whale abundance in the California Current is the trend-based estimate corresponding to the most recent survey (2008), or 2,142 animals (CV=0.58). The minimum population estimate for sperm whales is taken as the lower 20th percentile of the posterior distribution of abundance estimated from 2008 or 1,343 whales (Moore and Barlow, in press).

Sperm whale abundance appears to have been variable off California between 1979/80 and 1991 (Barlow, 1994) and between 1991 and 2008 (Barlow and Forney, 2007). However, there is no reason to believe that the population has declined; the most recent survey in 2008 likely reflects inter-annual variability with the study area. Sperm whale distribution and relative abundance may be correlated to the abundance of their main prey items. Jaquet and Gendron's (2002) research suggests that sperm whales changed their distribution in response to a decline in jumbo squid. The distribution and relative abundance of sperm whales in relation to key environmental features may also influence the distribution of their prey and thus, sperm whale relative abundance. Although the population in the eastern North Pacific is expected to have grown since large-scale pelagic whaling ceased in 1980, the possible effects of unreported catches are unknown (Yablokov, 1994; Clapham and Ivashchenko, 2009). The overall population of sperm whales has increased worldwide since it was listed under the ESA in 1973. Sperm whales are found year-round in California waters, but they reach peak abundance from April through mid-June and from the end of August through mid-November. They were seen in every season except winter (Dec-Feb) in Washington and Oregon. Although populations are expected to have increased due to the cessation of whaling, determining population trends has been difficult. This is in part because sperm whale migration patterns are not well understood (patterns seem to vary with age and sex) and because sperm whales occur in larger groups and tend to range more widely, making abundance estimates more variable than those of other large whales with similar population sizes. Moore and Barlow (in press)) report that the abundance of sperm whales appeared stable from 1991 to 2008, but that any reliable conclusions on trends could not be made for the whole population because the precision of estimated growth rates was poor. However, they also reported that trends in the detection of single animals (presumably large, solitary males) apparently doubled over this time period. The authors could not determine if the apparent increase in sightings of single animals reflected an increase in the number of adult male sperm whales in the population or merely increased use of the U.S. west coast by adult males in recent years. The total known or extrapolated fisheries-related M/SI for the13-year annual average is more than 10% of PBR, (PBR=2.7 animals/year) and the average annual fisheries-related M/SI for this stock is less than PBR for the 13-year annual average.

Accordingly, Criterion 3 is satisfied (Table 8) in determining that mortality and serious injury of the CA/OR/WA sperm whale stock incidental to commercial fishing would have a negligible impact on the stock because of individual review of data regarding the stock, including growth rate of the stock, and the level of HCM/SI is expected to be below the PBR. Given the infrequency of sperm whale interactions in the last 16 years (see Appendix 3) and the modifications to the CA thresher shark/swordfish drift gillnet fishery ($\geq$14 in mesh), the likelihood that another sperm whale would be taken by the CA thresher shark/swordfish drift

gillnet fishery (≥14 in mesh) is low (sperm whales have not interacted with any of the other Category II fisheries, such as the WA/OR/CA sablefish pot fishery, that overlap with this stock's distribution). Based on this information and the applicability of Criterion 3 (Table 8), NMFS determines that the mortality and serious injury incidental to commercial fisheries will have a negligible impact on the CA/OR/WA stock of sperm whales.

Table 8. Result for the Application of the Negligible Impact Determination Criterion by stock.

CA/OR/WA stock	**Is Criterion 1 Satisfied?** Total known, assumed, or extrapolated HCM/SI are less than 10% of PBR	**Is Criterion 2 Satisfied?** Total know, assumed, or extrapolated HCM/SI > PBR, and fisheries-related mortality is less than 10% of PBR	**Is Criterion 3 Satisfied?** Total known or extrapolated fisheries-related M/SI > 10% of PBR and less than PBR and the population is stable or increasing	**Is Criterion 4 Satisfied?** If abundance is declining, the threshold level of 10% of PBR will continue to be used and a more conservative criterion is warranted.	**Is Criterion 5 Satisfied?** If total known or extrapolated fisheries-related M/SI > PBR, permits may not be issued
Humpback whale	**No.** Not Satisfied, go to Criterion 2	**No.** Not Satisfied, go to Criterion 3	**Yes**. The total known 5-year fishery-related M/SI is >10% of PBR (40.0%), but less than PBR (PBR=11.0). The population is increasing.	*Previous Criterion Already Satisfied*	*Previous Criterion Already Satisfied*
Sperm whale	**No.** Not Satisfied, go to Criterion 2	**No.** Not Satisfied, go to Criterion 3	**Yes.** The total known or extrapolated 13-year fishery-related M/SI is 57.00% PBR, is greater than 10% of PBR, but less than PBR (PBR=2.7). The population is stable.	*Previous Criterion Already Satisfied*	*Previous Criterion Already Satisfied*

14.0 Negligible Impact Determination

Based on the review of the available data and applying the 1999 criteria for making a negligible impact determination under MMPA Section 101(a)(5)(E), all conditions of Criterion 3 are met by the available data for the CA/OR/WA stocks of humpback and sperm whales. For the following stocks, NMFS has determined that the mortality and serious injury incidental to the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) will have a negligible impact for purposes of issuing a permit under section 101(a)(5)(E) of the MMPA:

Humpback whale, CA/OR/WA stock
Sperm whale, CA/OR/WA stock

For the following stocks, NMFS has determined that the mortality and serious injury incidental to the WA/OR/CA sablefish pot fishery [11] will have a negligible impact for purposes of issuing a permit under section 101(a)(5)(E) of the MMPA:

Humpback whale, CA/OR/WA stock

For the following species of marine mammal stocks considered depleted under the MMPA because of their listing under the ESA, there is no documented evidence of interactions having occurred with the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) or WA/OR/CA sablefish pot fishery:

Blue whale, Eastern North Pacific stock
Fin whale, CA/OR/WA stock
Sei whale, Eastern North Pacific stock
Guadalupe fur seal
North Pacific Right whale, Eastern North Pacific stock
Killer whale, Eastern North Pacific Southern Resident stock
Gray whale, Western North Pacific stock

[11] Fisheries as classified in the 2014 List of Fisheries (79 FR 14418; March 14, 2014).

15.0 Literature Cited

Allen, B.M. and R.P. Angliss. 2014. Alaska Marine Mammal Stock Assessments, 2013. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-XXX, XXX (in press).

Andersen, M. S., K. A. Forney, T. V. N. Cole, T. Eagle, R. Angliss, K. Long, L. Barre, L. Van Atta, D. Borggaard, T. Rowles, B. Norberg, J. Whaley, and L. Engleby. 2008. Differentiating Serious and Non-Serious Injury of Marine Mammals: Report of the Serious Injury Technical Workshop, 10-13 September 2007, Seattle, Washington. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-39. 94 p.

Angliss, R. P., and D. P. DeMaster. 1998. Differentiating serious and non-serious injury of marine mammals taken incidental to commercial fishing operations: report of the serious injury workshop 1-2 April 1997, Silver Spring, Maryland. U.S. Dep. Commer., NOAA Tech Memo. NMFS-OPR-13, 48 p.

Barlow, J. 1994. Abundance of large whales in California coastal waters: a comparison of ship surveys in 1979/80 and in 1991. Rept. Int. Whal. Commn. 44:399-406.

Barlow, J. 1995. The abundance of large whales in California coastal waters: a comparison of ship surveys in 1979/80 and in 1991. Rept. Int. Whal. Commn. 44:399-406.

Barlow, J. 1997. Preliminary estimates of cetacean abundance off California, Oregon and Washington based on a 1996 ship survey and comparisons of passing and closing modes. Administrative Report LJ-97-11, Southwest Fisheries Science Center, National Marine Fisheries Service, P.O. Box 271, La Jolla, CA 92038. 25 p.

Barlow, J. 2010. Cetacean abundance in the California Current from a 2008 ship-based line-transect survey. NOAA Technical Memorandum, NMFS, NOAA-TM-NMFS-SWFSC-456.19 p.

Barlow, J. and G.A. Cameron. 2003. Field experiments show that acoustic pingers reduce marine mammals bycatch in the California drift gillnet fishery. Mar. Mamm. Sci., 19:265-283. pp. 265-283.

Barlow, J. and B.L. Taylor. 2005. Estimates of sperm whale abundance in the northeastern temperate Pacific from a combined acoustic and visual survey. Marine Mammal Science 21(3):429-445.

Barlow, J. and K.A. Forney. 2007. Abundance and population density of cetaceans in the California Current ecosystem. Fishery Bulletin 105:509-526.

Barlow, J., S., Swartz, T. Eagle and P. Wade. 1995. U.S. marine mammal stock assessments: guidelines for preparation, background, and a summary of the 1995 assessments. U.S. Dept. Commer., NOAA Tech Memo NMFS-SWFSC-219. 162 p.

Bigg, M. A., P. F. Olesiuk, G. M. Ellis, J. K. B. Ford, and K. C. Balcomb, III. 1990. Social organization and genealogy of resident killer whales (*Orcinus orca*) in the coastal waters of British Columbia and Washington State. Rep. Int. Whal. Commn. (Spec. Iss. 12):383-405.

Braham, H.W. 1991. Endangered whales: status update. A Report on the 5-year status of the stocks review under the 1978 amendments to the U.S. Endangered Species Act. NMFS Unpublished Report.

Brownell R. L., Jr., A. R. Lang, A. M. Burdin, A. B. Bradford, and D. W. Weller. 2009. The western gray whale population is distinct: a response to SC/61/BRG22. Rep. Int. Whal. Commn. SC/61/BRG30.

Calambokidis, J. 2013. Updated abundance estimates of blue and humpback whales off the US west coast incorporating photo-identifications from 2010 and 2011. Document PSRG-2013-13 presented to the Pacific Scientific Review Group, April 2013. 7 p.

Calambokidis, J., T. Chandler, K. Rasmussen, G. H. Steiger, and L. Schlender. 1999. Humpback and blue whale photo-identification research off California, Oregon and Washington in 1998. Final Contract Report to Southwest Fisheries Science Center, National Marine Fisheries Service, P.O. Box 271, La Jolla, CA 92038. 35 p.

Calambokidis, J., T. Chandler, L. Schlender, G.H. Steiger, and A. Douglas. 2003. Research on humpback and blue whales off California, Oregon, and Washington in 2002. Final Contract Report to Southwest Fisheries Science Center, National Marine Fisheries Service, P.O. Box 271, La Jolla, CA 92038. 47 p.

Calambokidis, J., E.A. Falcone, T.J. Quinn, A.M. Burdin, P.J. Clapham, J.K.B. Ford, C.M. Gabriele, R. LeDuc, D. Mattila, L. Rojas-Bracho, J.M. Straley, B.L. Taylor, J. Urban, D. Weller, B.H. Witteveen, M. Yamaguchi, A. Bendlin, D. Camacho, K. Flynn, A. Havron, J. Huggins, and N. Maloney. 2008. SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific. Final report for Contract AB133F-03-RP-00078. 58 p. Available from Cascadia Research (www.cascadiaresearch.org) and NMFS, Southwest Fisheries Science Center (http://swfsc.noaa.gov).

Calambokidis, J., E. Falcone, A. Douglas, L. Schlender, and J. Huggins. 2009. Photographic identification of humpback and blue whales off the U.S. West Coast: results and updated abundance estimates from 2008 field season. Final Report for Contract AB133F08SE2786 from Southwest Fisheries Science Center. 18 p.

Carretta, J.V. and L. Enriquez. 2006. Marine mammal bycatch and estimated mortality in California commercial fisheries during 2005. Administrative Report LJ-06-07, available from Southwest Fisheries Science Center, 8604 La Jolla Shores Drive, La Jolla, CA 92037. 14 p.

Carretta, J.V. and L. Enriquez. 2007. Marine mammal and sea turtle bycatch in the California/Oregon thresher shark and swordfish drift gillnet fishery in 2006. Administrative Report LJ-07-06, available from Southwest Fisheries Science Center, 8604 La Jolla Shores Drive, La Jolla, CA 92037. 9 p.

Carretta, J.V. and L. Enriquez. 2009a. Marine mammal and seabird bycatch observed in California commercial fisheries in 2007. Administrative Report LJ-09-01, available from Southwest Fisheries Science Center, 3333 North Torrey Pines Rd., La Jolla, CA 92037. 12 p.

Carretta, J.V. and L. Enriquez. 2009b. Marine mammal bycatch observed in the California/Oregon swordfish and thresher shark drift gillnet fishery in 2008. Administrative Report LJ-09-03, available from Southwest Fisheries Science Center, 3333 North Torrey Pines Rd., La Jolla, CA 92037. 10 p.

Carretta, J.V. and J. Barlow. 2011. Long-term effectiveness, failure rates, and "dinner bell" properties of acoustic pingers in a gillnet fishery. Marine Technology Society Journal 45(5):7-19.

Carretta, J.V. and L. Enriquez. 2012. Marine Mammal and Sea Bird Bycatch in California Drift Gillnet Fisheries in 2010. NOAA Administrative Report LJ-12-01, available from Southwest Fisheries Science Center, 3333 North Torrey Pines Rd., La Jolla, CA 92037. February 2012. 15 p.

Carretta, J.V. and J.E.Moore. 2014. Recommendations for pooling annual bycatch estimates when events are rare. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-528, available from Southwest Fisheries Science Center, 8901 La Jolla Shores Drive, La Jolla, CA 92037, 15 p.

Carretta, J.V., T. Price, D. Petersen, and R. Read. 2005. Estimates of marine mammal, sea turtle, and seabird mortality in the California drift gillnet fishery for swordfish and thresher shark, 1996-2002. Marine Fisheries Review 66(2):21-30.

Carretta, J.V., K.A. Forney, M.M. Muto, J. Barlow, J. Baker, B. Hanson, and M.S. Lowry. 2006. U.S. Pacific Marine Mammal Stock Assessments: 2005. U.S. Department of Commerce Technical Memorandum, NOAA-TM-NMFS-SWFSC-388, 317 p.

Carretta, J.V., K.A. Forney, E. Oleson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, J. Baker, B. Hanson, D. Lynch, L. Carswell, R. L. Brownell Jr., J. Robbins, D. K. Mattila, K. Ralls, and M. C. Hill. 2012. U.S. Pacific Marine Mammal Stock Assessment Report: 2011. U.S. Department of Commerce Technical Memorandum, NOAA-TM-NMFS-SWFSC-488, 360 p.

Carretta, J.V., K.A. Forney, E. Oleson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, J. Baker, B. Hanson, D. Lynch, L. Carswell, R. L. Brownell Jr., J. Robbins, D. K. Mattila, K. Ralls, and M. C. Hill. 2014. U.S. Pacific Marine Mammal Stock Assessment Report: 2013. (in press)).

Clapham, P.J., S. Leatherwood, I. Szczepaniak, and R.L. Brownell, Jr. 1997. Catches of humpback and other whales from shore stations at Moss Landing and Trinidad, California, 1919B1926. Mar. Mamm. Sci. 13:368B394.

Clapham, P.J. and Y. Ivashchenko. 2009. A Whale of Deception. Marine Fisheries Review. 71:44-52.

Dohl, T. P., R. C. Guess, M. L. Duman, and R. C. Helm. 1983. Cetaceans of central and northern California, 1980-83: Status, abundance, and distribution. Final Report to the Minerals Management Service, Contract No. 14-12-0001-29090. 284 p.

Ford, J.K.B., G.M. Ellis, and K.C. Balcomb. 2000. Killer whales: The natural history and genealogy of *Orcinus killer whale* in British Columbia and Washington State (2nd ed.). UBC Press, Vancouver.

Forney, K.A. 2007. Preliminary estimates of cetacean abundance along the U.S. west coast and within four National Marine Sanctuaries during 2005. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-406. 27 p.

Forney, K. A., J. Barlow, and J. V. Carretta. 1995. The abundance of cetaceans in California waters. Part II: Aerial surveys in winter and spring of 1991 and 1992. Fish. Bull. 93:15-26.

Green, G. A., J. J. Brueggenman, R. A. Grotefendt, C. E. Bowlby, M. L. Bonnell, K. C. Balcom, III. 1992. Cetacean distribution and abundance off Oregon and Washington, 1989-1990. Ch. 1 *in* J. J. Brueggeman (ed.). *Oregon and Washington Marine Mammal and Seabird Surveys*. Minerals Management Service Contract Report 14-12-0001-30426.

Heyning, J.E., and T.D. Lewis. 1990. Entanglements of baleen whales in fishing gear of southern California. Rep. int. Whal. Commn 40:427B437.

Jaquet, N. and D. Gendron. 2002. Distribution and relative abundance of sperm whales in relation to key environmental features, squid landings and the distribution of other cetacean species in the Gulf of California, Mexico. Marine Biology 141:591–601.

Lang, A.R., Weller, D.W., Leduc, R.G., Burdin, A.M., Hyde, J. and Brownell, R.L., Jr. 2004. Genetic differentiation between western and eastern gray whale populations using microsatellite markers Paper SC/56/BRG38 of the IWC Scientific Committee. 15 p.

Lang, A. R., Weller, D. W., Leduc, R. G., Burdin, A. M., & Brownell Jr, R. L. 2005. Genetic assessment of the western gray whale population: current research and future directions. Unpublished paper to the IWC Scientific Committee.

Lang A.R. 2010. The population genetics of gray whales *(Eschrichtius robustus)* in the North Pacific. PhD dissertation, University of California, San Diego, CA.

Lang, A.R., D.W. Weller, R.G. LeDuc, A.M. Burdin, and R.L. Brownell, Jr. 2010. Genetic differentiation between western and eastern (*Eschrichtius robustus*) gray whale populations using microsatellite markers. Paper SC/62/BRG11 presented to the International Whaling Commission Scientific Committee (Unpublished). 18 p. Available at http://www.iwcoffice.org.

Lang A.R.,D.W. Weller, R. LeDuc, A.M. Burdin, V.L. Pease, D. Litovka, V. Burkanov, R.L. Brownell, Jr. 2011. Genetic analysis of stock structure and movements of gray whales in the eastern and western North Pacific. Paper SC/63/BRG10 presented to the International Whaling Commission**.**

LeDuc, R. G., D. W. Weller, J. Hyde, A. M. Burdin, P. E. Rosel, R. L. Brownell, Jr., B. Wursig, and A. E. Dizon. 2002. Genetic differences between western and eastern gray whales (*Eschrichtius robustus*). Journal of Cetacean Research and Management.

Mate, B., A.L. Bradford, G. Tsidulko, V. Vertyankin,V. IlyashenkoV.2011. Late-feeding season movements of a western North Pacific gray whale off Sakhalin Island, Russia and subsequent migration into the Eastern North Pacific.Paper SC/63/BRG23 presented to the International Whaling Commission Scientific Committee. Available at www.iwcoffice.org.

McDonald, M.A., J.A. Hildebrand, and S.C. Webb. 1995. Blue and fin whales observed on a seafloor array in the Northeast Pacific. *Journal of the Acoustical Society of America* 98 (2), pp. 712–721. Available at: http://repositories.cdlib.org/postprints/2320.

Moore, J.E., and J. Barlow. 2011. Bayesian hierarchical estimation of fin whale abundance trends from a 1991-2008 time series of line-transect surveys in the California Current. *Journal of Applied Ecology* 48:1195-1205.

Moore JE, and J. P. Barlow. (2013) Declining Abundance of Beaked Whales (Family Ziphiidae) in the California Current Large Marine Ecosystem. PLoS ONE 8(1): e52770. doi:10.1371/journal.pone.0052770.

Moore, J.E. and J. Barlow. 2014 (In press). Improved abundance and trend estimates for sperm whales in the eastern North Pacific from Bayesian hierarchical modeling.

Moore, J.E., and Merrick, R., editors. 2011. Guidelines for Assessing Marine Mammal Stocks: Report of the GAMMS III Workshop, February 15–18, 2011, La Jolla, California. Dept. of Commerce, NOAA Technical Memorandum NMFS-OPR-47.

Moore, S.E., K.M. Stafford, M.E. Breiwick, C.G. Fox, H.W. Braham, J.J. Polovina, and D.E. Bain. 1998. Seasonal variation in reception of fin whale calls at five geographic areas in the North Pacific. Mar. Mamm. Sci. 14(3):617-627.

National Marine Fisheries Service (NMFS). 1997. Final Pacific Offshore Cetacean Take Reduction Plan. 501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802.

NMFS. 2005. Essential Fish Habitat Final Environmental Impact Statement. Appendix 8. Description of fishing gears used on the United States west coast. December 2005.

NMFS. 2000. Final Environmental Assessment of the Pelagic Fisheries of the Western Pacific Region. August, 2000. NOAA-NMFS-SWFSC-Honolulu Laboratory.

NMFS. 2010a. WA/OR/CA Sablefish Pot Fishery. http://www.nmfs.noaa.gov/pr/pdfs/fisheries/wa_or_ca_sablefish_pot.pdf**.** Accessed May 2012.

NMFS. 2010b. Final Recovery Plan for the Fin Whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD. 121 p.

NMFS. 2010c. Recovery plan for the sperm whale (*Physeter macrocephalus*). National Marine Fisheries Service, Silver Spring, MD. 165 p.

NMFS 2012d. NMFS Policy Directive PD 02-238, Process for Distinguishing Serious from Non-Serious Injury of Marine Mammals, Effective Date January 27, 2012. NMFS Instruction 02-238-01, Process for Injury Determinations, Effective Date January 27, 2012.

NMFS West Coast Regional Marine Mammal Stranding Database. 2014. California, Oregon, and Washington Marine Mammal Stranding Database, searched from January 1, 1998-December 31, 2013.

Northwest Fisheries Science Center (NWFSC) 2010. Data report and summary analyses of the U.S. west coast non-nearshore fixed gear groundfish fishery. West Coast Groundfish Observer Program. National Marine Fisheries Service, NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112.

Reeves, R.R., and H. Whitehead. 1997. Status of the sperm whale, *Physeter macrocephalus*, in Canada. Can. Field-Nat. 111:293-307.

Rice, D. W. 1974. Whales and whale research in the eastern North Pacific. Pp. 170-195 In: W. E. Schevill (ed.). *The Whale Problem: A Status Report*. Harvard Press, Cambridge, MA.

Rice, D.W. 1989. Sperm whale *Physeter macrocephalus* Linnaeus, 1758. Pp. 177-233 in S.H. Ridgway and R. Harrison (eds.), Handbook of marine mammals, vol. 4. Academic Press, London.

Saez, L., D. Lawson, M. DeAngelis, E. Petras, S. Wilkin, and C. Fahy. 2013. Understanding the co-occurrence of large whales and commercial fixed gear fisheries off the west coast of the United States. U.S. Department of Commerce Technical Memorandum, NOAA-TM-NMFS-SWR-044, 102 p.

Saez L., D. Lawson, M. DeAngelis, S. Wilkin, J. Viezbike, E. Petras, C. Fahy, and B. Norberg. (In prep). Large whale entanglements off the west coast of the United States.

Swartz, S. L., B. L. Taylor, and D. J. Rugh. 2006. Gray whale *Eschrichtius robustus* population and stock identity. Mammal Review 36:66-84.

Urbán R., J., Weller, D., Tyurneva, O., Swartz, S., Bradford, A., Yakovlev,Y., Sychenko, O., Rosales N., H.,Martínez A., S., Burdin, A. and Gómez-Gallardo U., A. 2012. Report on the photographic comparison of the western and Mexican gray whale catalogues. Paper SC/64/BRG13 presented to the Scientific Committee of the International Whaling Commission. Available at http://www.iwcoffice.org/.

Wade, P. R. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. Mar. Mamm. Sci., 14(1): 1-37.

Weller, D. W., Burdin, A.M., Bradford, A.L., Ivashchenko, Y.I., Tsidulko, G.A., Lang, A.R. and Brownell, R.L., Jr. 2004. Status of western gray whales off northeastern Sakhalin Island, Russia, in 2003. Paper SC/56/BRG40 presented to the IWC Scientific Committee (unpublished). 18 p.

Weller, D. W., Bradford, A. L., Tsidulko, G. A., Ivashchenko, Y. V., Lang, A. R., Kim, H. W., Burdin, A.M., and Brownell Jr, R. L. 2006. A catalog of photo-identified western gray whales from Sakhalin Island, Russia. Paper SC/58/BRG2 presented to the IWC Scientific Committee.

Weller D.W., Klimek A., Bradford A.L., Calambokidis J., Lang A.R., Gisborne B., Burdin A.M., Szaniszlo W.,Urban J., Gomez-Gallardo Unzueta A., Swartz S. and Brownell R.L., Jr. 2012. Movements of gray whales between the western and eastern North Pacific. Endangered Species Research 18:193-199.

Yablokov, A.V. 1994. Validity of whaling data. Nature 367:108.

Personal Communication

James V. Carretta, National Marine Fisheries Service, Southwest Regional Office, La Jolla, CA. Review of human-caused strandings to determine if resulted in a serious injury or mortality to ESA-listed marine mammmals.

Lyle Enriquez, National Marine Fisheries Service, West Coast Regional Office, Long Beach, CA. May 2014.

Marlene Bellman, National Marine Fisheries Service Observer Program, Northwest Fisheries Science Center, Seattle, WA, June 2014.

National Marine Fisheries Service (NMFS) Observer Program. 2014. Report for catch summaries from 1990/91-2011/12 for the CA thresher shark/swordfish drift gillnet fishery

received from Charles Villafana, National Marine Fisheries Service, Southwest Regional Office, Sustainable Fisheries Division, on July 25, 2012.

Lauren Saez, Contractor for Ocean Associates for the National Marine Fisheries Service, Southwest Regional Office, May 2012.

16.0 APPENDIX 1

Marine Mammal Stock Assessment Terminology

Under section 117 of the MMPA, NMFS and the U.S. Fish and Wildlife Service are required to publish stock assessment reports for all stocks of marine mammals within U.S. waters, to review new information every year for strategic stocks and every three years for non-strategic stocks, and to update the stock assessment reports when significant new information becomes available. Under MMPA Section 3(19), a strategic stock is defined as a marine mammal stock:

(A) for which the level of direct human-caused mortality exceeds the potential biological removal [(PBR)] level;
(B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the [ESA] within the foreseeable future; or
(C) which is listed as a threatened species or endangered species under the [ESA], or is designated as depleted under [the MMPA].

Under MMPA Section 3, the PBR level means the maximum number of animals, not including natural mortality that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimal sustainable population (OSP). Optimum sustainable population means the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element. The PBR level is the product of the following factors: 1) The minimum population estimate of the stock (N_{MIN}); 2) One-half the maximum theoretical or estimated net productivity rate of the stock at a small population size, where net productivity rate is the annual per capita rate of increase in a stock resulting from additions due to reproduction, less losses due to mortality (½ R_{MAX}); and 3) A recovery factor (R_F) or "safety factor" of between 0.1 and 1.0 to hasten the recovery of depleted populations and to account for additional uncertainties. The use of PBR as a management scheme is a conservative approach that will allow populations to recover to or remain above OSP. Wade (1998), using simulation models, demonstrated that a PBR calculated with a recovery factor of 0.1 would meet two performance goals: 1) 95% of simulations would equilibrate within 95% of carrying capacity (K), and 2) there would be no more than a 10% delay in recovery. Mortality limits were evaluated based on whether at least 95% of the simulated populations met two criteria: 1) the populations starting at the maximum net productivity levels (MNPL) stayed there or above after 20 years, and 2) that populations starting at 30% of K recovered to at least MNPL after 100 years (Wade 1998).

When calculating PBRs, NMFS chose to use a value of 0.1 for the safety factor for species listed as endangered under the ESA, based partly on the rationale that this would not cause more than a 10% increase in the time to recovery (Barlow *et al*. 1995). Using 0.1 as a safety factor in the PBR equation would allow a large fraction of the net production of the population to contribute to population increase and eventual recovery, and thus, have a relatively insignificant negative impact upon the population (Wade 1998). For depleted and threatened stocks and stocks of unknown status, a recovery factor of 0.5 is used, and for stocks thought to be within OSP, a

recovery factor of 1.0 is used (Barlow *et al*., 1995). However, before the recovery factor is set as high as 1.0, reasonable scientific justification needs to be provided that the estimates of abundance and mortality are not severely biased and have estimated CVs than or equal to 0.8 for the abundance estimate and 0.3 for the mortality estimates (Barlow *et al*., 1995).

Literature Cited

Barlow, J., S., Swartz, T. Eagle and P. Wade. 1995. U.S. marine mammal stock assessments: guidelines for preparation, background, and a summary of the 1995 assessments. U.S. Dept. Commer., NOAA Tech Memo NMFS-SWFSC-219. 162 p.

Wade, P. R. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. Mar. Mamm. Sci., 14(1): 1-37.

17.0 APPENDIX 2

Measures implemented under the Highly Migratory Species (HMS) Fishery Management Plan

The NMFS Biological Opinion, dated February 4, 2004, on the adoption of the proposed HMS FMP includes the following description of final rules to implement the HMS FMP (pages 7-16).

The measures that would be implemented under the HMS FMP are:

1. Owners and operators of vessels registered for use of longline gear may not use longline gear to fish for or target swordfish (*Xiphias gladius*) west of 150^0 W. long. and north of the equator (0^0 N. lat.).

2. A person aboard a vessel registered for use of longline gear fishing for HMS west of 150^0 W. long. and north of the equator (0^0 N. lat.) may not possess or deploy any float line that is shorter than or equal to 20 m (65.6 ft or 10.9 fm). As used here, float line means a line used to suspend the main longline beneath a float.

3. From April 1 through May 31, owners and operators of vessels registered for use of longline gear may not use longline gear in waters bounded on the south by 0^0 lat., on the north by 15^0 N. lat., on the east by 145^0 W. long., and on the west by 180^0 long.

4. From April 1 through May 31, owners and operators of vessels registered for use of longline gear may not receive from another vessel HMS that were harvested by longline gear in waters bounded on the south by 0^0 lat., on the north by 15^0 N. lat., on the east by 145^0 W. long., and on the west by 180^0 long.

5. From April 1 through May 31, owners and operators of vessels registered for use of longline gear may not land or transship HMS that were harvested by longline gear in waters bounded on the south by 0 lat., on the north by 15^0 N. lat., on the east by 145^0 W. long., and on the west by 180^0 long.

6. No light stick may be possessed on board a vessel registered for use of longline gear during fishing trips that include any fishing west of 150^0 W. long. and north of the equator (0^0 N. lat.). A light stick as used in this paragraph is any type of light emitting device, including any florescent glow bead, chemical, or electrically powered light that is affixed underwater to the longline gear.

7. When a conventional monofilament longline is deployed in waters west of 150^0 W. long. and north of the equator (0^0 N. lat.) by a vessel registered for use of longline gear, no fewer than 15 branch lines may be set between any two floats. Vessel operators using basket-style longline gear must set a minimum of 10 branch lines between any 2 floats when fishing in waters north of the equator.

8. Longline gear deployed west of 150^0 W. long. and north of the equator (0^0 N. lat.) by a

vessel registered for use of longline gear must be deployed such that the deepest point of the main longline between any two floats, i.e., the deepest point in each sag of the main line, is at a depth greater than 100 m (328.1 ft or 54.6 fm) below the sea surface.

9. Owners and operators of longline vessels registered for use of longline gear may land or possess no more than 10 swordfish from a fishing trip where any part of the trip included fishing west of 150^0 W. long. and north of the equator (0^0 N. lat.).

10. Fishing vessels that use longline gear to catch managed species beyond the EEZ and east of 150^0 W. longitude are not prohibited from making shallow water sets of the type used to target swordfish and are not subject to the limitations of items 2, 6, 7, 8, and 9 above.

* * *

Drift Gillnet Controls

The proposed regulations would not affect the gear restrictions resulting from the Pacific Offshore Cetacean Take Reduction Plan established under the authority of the Marine Mammal Protection Act of 1972. These measures can be found at 50 CFR 229.31.

The proposed regulations would maintain, but under MSA authority, conservation and management measures now in place under the authority of the Endangered Species Act and the State of California Fish and Game Code as follows:

1. The maximum length of a drift gillnet on board a vessel shall not exceed 6,000 feet.
2. Up to 1,500 feet of drift gillnet in separate panels of 600 feet may be on board the vessel in a storage area.

Protected Resource Area Closures:

1. No person may fish with, set, or haul back drift gillnet gear in U.S. waters of the Pacific Ocean from August 15 through November 15 in the area bounded by straight lines connecting the following coordinates in the order listed:

(a) Pt. Sur at 36^0 18.5' N. lat., to
(b) 34^0 27' N. lat. 123^0 35' W. long.;
(c) 34^0 27' N. lat. 129^0 W. long.;
(d) 45^0 N. lat. 129^0 W. long., thence
(e) to the point where 45^0 N. lat. intersects the Oregon coast.

2. No person may fish with, set, or haul back drift gillnet gear in U.S. waters of the Pacific Ocean east of 120^0 W. long. during the months of June, July, and August, during a forecasted or occurring El Nino event off Southern California. The Assistant Administrator will publish a notification in the Federal Register that an El Nino event is occurring off, or is forecast for off, the coast of southern California and the requirement for time area closures in the Pacific loggerhead conservation zone. The notification will also be announced in summary form by

other methods as the Assistant Administrator determines necessary and appropriate to provide notice to the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). The Assistant Administrator will rely on information developed by NOAA offices that monitor El Nino events, such as NOAA's Coast Watch program, and developed by the State of California, to determine if such a notice should be published. The requirement for the area closures from June 1 through August 31 will remain effective until the Assistant Administrator issues a notice that the El Nino event is no longer occurring.

Mainland area closures:

The following areas off the Pacific coast are closed to driftnet gear:
1. Within the U.S. EEZ from the United States-Mexico International Boundary to the California-Oregon border from February 1 through April 30.

2. In the portion of the U.S. EEZ within 75 nm from the mainland shore from the United States-Mexico International Boundary to the California-Oregon border from May 1 through August 14.

3. In the portion of the U.S. EEZ within 25 nm of the coastline from December 15 through January 31 of the following year from the United States-Mexico International Boundary to the California-Oregon border.

4. In the portion of the U.S. EEZ from August 15 through September 30 within the area bounded by line extending from Dana Point to Church Rock on Santa Catalina Island, to Point La Jolla.

5. In the portion of the U.S. EEZ within 12 nm from the mainland shore north of a line extending west of Point Arguello to the California-Oregon border.

6. In the portion of the U.S. EEZ within the area bounded by a line from the lighthouse at Point Reyes, California to Noonday Rock, to Southeast Farallon Island to Pillar Point.

7. In the portion of the U.S. EEZ off the Oregon coast east of a line approximating 1000 fathoms as defined by the following coordinates:

42^0 00' 00" N. lat. 125^0 10' 30" W. long.
42^0 25' 39" N. lat. 124^0 59' 09" W. long.
42^0 30' 42" N. lat. 125^0 00' 46" W. long.
42^0 30' 23" N. lat. 125^0 04' 14" W. long.
43^0 02' 56" N. lat. 125^0 06' 57" W. long.
43^0 01' 29" N. lat. 125^0 10' 55" W. long.
43^0 50' 11" N. lat. 125^0 19' 14" W. long.
44^0 03' 23" N. lat. 125^0 12' 22" W. long.
45^0 00' 06" N. lat. 125^0 16' 42" W. long.
45^0 25' 27" N. lat. 125^0 16' 29" W. long.
45^0 45' 37" N. lat. 125^0 15' 19" W. long.
46^0 04' 45" N. lat. 125^0 24' 41" W. long.

46^0 16' 00" N. lat. 125^0 20' 32" W. long.

8. In the portion of the U.S. EEZ north of 46^0 16' N. latitude (Washington coast).

Channel Islands area closures:

The following areas off the Channel Islands are closed to driftnet gear:

1. San Miguel Island closures.
(a) Within the portion of the U.S. EEZ north of San Miguel Island between a line extending 6 nm west of Point Bennett and a line extending 6 nm east of Cardwell Point.
(b) Within the portion of the U.S. EEZ south of San Miguel Island between a line extending 10 nm west of Point Bennett and a line extending 10 nm east of Cardwell Point.

2. Santa Rosa Island Closure. Within the portion of the U.S. EEZ north of San Miguel Island between a line extending 6 nm west from Sandy Point and a line extending 6 nm east of Skunk Point from May 1 through July 31.

3. San Nicolas Island closure. In the portion of the U.S. EEZ within a radius of 10 nm of 33^0 16' 41" N. lat., 119^0 34' 39" W. long. (west end) from May 1 through July 31.

4. San Clemente Island closure. In the portion of the U.S. EEZ within 6 nm of the coastline on the easterly side of San Clemente Island within a line extending 6 nm west from 33^0 02' 16" N. lat., 118^0 35' 27" W. long. and a line extending 6 nm east from the light at Pyramid Head

Regulations in place under the MMPA would be unchanged. The Take Reduction Team process would continue to be the principal mechanism for considering regulatory changes to meet MMPA requirements.

*** * * * ***

18.0 APPENDIX 3

A comparison of mortality and serious injury for the CA/OR/WA humpback and sperm whale stocks for three time frames: 5 years (2009-2013), 13 years (2001-2013), and 16 years (1998-2013).

5-year time frame (2009-2013)

The first time frame we considered for both stocks of whales was the most recent five-year period (January 1, 2009 through December 31, 2013) and is typically used for negligible impact determination analyses. A five-year time frame provides enough data to adequately capture year-to-year variations in take levels, while reflecting current environmental and fishing conditions as they may change over time.

13-year time frame (2001-2013)

The Guidelines for Assessing Marine Mammal Stocks (GAMMS) suggest that mortality estimates could be averaged over as many years as necessary to achieve a CV of less than or equal to 0.3. Caretta and Moore (2014) recommend pooling longer time series of data particularly when bycatch is a rare event[12]. For example, pooling 10 years of fishery data resulted in bycatch estimates within 25% of the true bycatch rate over 50% of the time (estimates were within 25% of the true value more often than not). Key to this approach, however, was that the underlying pooled fishery data reflected a fishery with sufficiently constant characteristics (effort, gear, locations, etc.,) to pool the data. Rare bycatch events typically involve populations with low PBR. If true bycatch mortality is low, but near PBR, then estimation bias needs to be reduced to allow reliable evaluation of the bycatch estimate against a low removal threshold. The post-2000 time period best represents the current spatial state of the fishery and is used to calculate mean annual bycatch, based on recommendations contained in the GAMMS and Carretta and Moore (2014; specific to sperm whales).

16-year timeframe

The third timeframe is from 1998 (the first full year post- Pacific Offshore Cetacean Take Reduction Plan (Plan) implementation (October 30, 1997)), through December 31, 2013. This 16-year time frame was chosen to provide historical context because after the Plan was implemented, regulations required skippers to use at least 36' extenders and pingers in the CA thresher shark/swordfish drift gillnet fishery ($\geq$14 inch mesh), which is considered to have reduced the incidental take of many marine mammal species, particularly cetaceans (Carretta and Barlow 2011). This time frame also provided a comprehensive look at all of the fisheries, including the WA/OR/CA sablefish pot fishery, given changes in oceanographic conditions,

[12] The Pacific Offshore Take Reduction Team met in February 2014 and presented a meeting a summary and consensus recommendations in the Key Outcomes Memorandum[12]. As part of their consensus recommendations, the Team recommended that NMFS and the Scientific Review Groups examine the efficacy of increasing the number of years used in the mortality estimates for a stock, beyond five years, in cases where mortality/serious injury events are very rare and a larger pool of years might improve the precision and accuracy of mortality/serious injury. In order to increase the accuracy of the bycatch estimate, Caretta and Moore (2014) recommend pooling longer time series of data.

fishing practices, and reporting and stranding records. The 2001 time/area closure of the CA thresher shark/swordfish drift gillnet fishery (≥14 inch mesh) off central and northern California/southern Oregon is also encompassed in this time frame.

The M/SI of humpback whales and sperm whales incidental to state and federal commercial fisheries from 1998-2013 are summarized by year in Table A.3.1. The M/SI from fisheries is described as either 1) "Observed fishery M/SI (observer coverage rate)," which indicates those records that were observed by a NMFS federal observer and the corresponding observer coverage rate provided in the parentheses; 2) "Extrapolated[13] takes from observed M/SI" provides the extrapolated value from the observed serious injury or mortality multiplied by the observer coverage rate; 3) "Other reported fishery M/SI" represents any other fishery-related serious injury or mortality that was not observed or reported by a NMFS federal observer; and, 4) "Non-fishery human-caused M/SI (source)" indicative of any record of a non-fishery serious injury or mortality with the source of that serious injury or mortality included in parentheses. In Table A.3.1, we also provide the minimum fishery HCM/SI and minimum total HCM/SI from all human-caused sources which are additive, and both include the observed (by NMFS federal observer) extrapolated fishery-related mortality and serious injury and the other fishery-related (non-extrapolated) records of serious injury or mortality. Here we evaluate three time frames for both stocks: 5 years (2009-2013), 13 years (2001-2013), and 16 years (1998-2013).

Fishery Mortality and Serious Injury

From 1998 to 2013, the total of all known or assumed humpback whale M/SI incidental to commercial fishing operations is 53 animals, resulting in an annual average take of 3.31 animals. From 2001 to 2013, the total known or assumed M/SI incidental to commercial fishing operation is 48 humpback whales, resulting in an annual average take of 3.69 animals. From 2009 through 2013, the total known or assumed M/SI incidental to commercial fishing operations is 22 humpback whales, resulting in an annual average take of 4.4 animals. The current PBR calculated for this stock is 11.0 animals. Therefore, the total annual 16-year (1998-2013) average M/SI of humpback whales in commercial fisheries is 30.10%, the annual 13-year (2001-2013) average M/SI of humpback whales in commercial fisheries is 33.55%, and the 5-year (2009-2013) average is 40.00% of the current PBR.

From 1998 to 2013, the total known or extrapolated sperm whale M/SI incidental to commercial fishing operations is 25, resulting in an annual average take of 1.56 animals. From 2001 through 2013, the total known or extrapolated M/SI due to commercial fishing operations is 20 sperm whales, resulting in an annual average take of 1.53 animals. From 2009 through 2013, the total known or extrapolated M/SI incidental to commercial fishing operations is 16 sperm whales, resulting in an annual average take of 3.20 animals. The overall PBR calculated for this stock is

[13] Extrapolation is only possible when a mortality or serious injury is observed by a NMFS federal observer and the mortality or serious injury is multiplied by the observer coverage rate for that year. Other fishery-related mortality and serious injury is reported in Table 5 as "non-extrapolated" because there is no corresponding observer coverage. The mortality and serious injury cannot be extrapolated, since there is no observer coverage rate for that fishery-related mortality or serious injury.

2.7 animals. Therefore, the total annual 16-year (1998-2013) average incidental take in commercial fisheries is 57.90%, the 13-year (2001-2013) average is 57.00%, and the 5-year (2009-2013) average is 118.50% of the PBR.

Ship Strike Mortality and Serious Injury
The same 16-year, 13-year, and 5-year time frames used above for commercial fisheries were also used to analyze other human-caused injury and mortality. Under the ship strike descriptions in A.3.1, either (1) the ship strike was the confirmed cause of serious injury and/or mortality from direct observation from the ship or from the necropsy; or (2) the ship strike is assumed to be the cause of serious injury and/or mortality based on the report that accompanied the event (*e.g.*, ship captain observed blood in the water).

From 1998-2013, the total number of observed or assumed humpback whale M/SI attributed to ship strikes is 11 which results in an annual average of 0.69 humpback whales. From 2001-2013, the total number of observed or assumed M/SI attributed to ship strikes is 10, resulting in an annual average of 0.77 humpback whales. From 2009-2013, the total number of observed or assumed M/SI attributed to ship strikes is 3, resulting in an annual average of 0.60 humpback whales. Therefore, the total annual 16-year (1998-2013) average incidental take by ship strikes is 6.27% of PBR, the 13-year (2001-2013) average is 7.00%, and the five-year (2009-2013) average is 5.45% of PBR. No other sources of direct HCM/SI or are known to affect the CA/OR/WA stock of humpback whales.

From 1998-2013, the total number of observed or assumed sperm whale M/SI attributed to ship strikes is 4.0, which results in an annual average of 0.25 sperm whales. From 2001-2013, the total number of observed or assumed M/SI attributed to ship strikes is 3.0, resulting in an annual average of 0.23 sperm whales. From 2009-2013, the total number of observed or assumed M/SI attributed to ship strikes is 1, resulting in an annual average of 0.2 sperm whales. Therefore, the total annual 16-year (1998-2013) average incidental take by ship strikes is 9.26% of PBR, the 13-year (2001-2013) average is 8.50%, and the 5-year (2009-2013) average incidental take by ship strikes is 7.41% of PBR. No other sources of direct HCM/SI are known to affect the CA/OR/WA stock of sperm whales.

Total Human-Caused Mortality and Serious Injury
The 16-year (1998-2013) average annual HCM/SI of humpback whales, including ship strikes and incidental to all commercial fishing is 4.0 or 36.37% of the PBR for the CA/OR/WA humpback whale stock (Tables A.3.1, A.3.2 and A.3.3). The 13-year (2001-2013) average annual HCM/SI, including ship strikes and incidental to all commercial fishing is 4.46 or 40.55% of the PBR for the CA/OR/WA humpback whale stock (Tables A.3.1, A.3.2, and A.3.3). The 5-year (2009-2013) average annual HCM/SI, including ship strikes and incidental to all commercial fishing is 5.0 or 45.45% of the PBR for the CA/OR/WA humpback whale stock (Table A.3.1, A.3.2, and A.3.3).

The 16-year (1998-2013) average annual HCM/SI of sperm whales, including ship strikes and incidental to all commercial fishing for is 1.8 or 67.10% of the PBR for the CA/OR/WA sperm whale stock (Tables A.3.1, A.3.2, and A.3.3). The 13-year (2001-2013) average annual

HCM/SI, including ship strikes and incidental to all commercial fishing is 1.7 or 65.5% of the PBR for the CA/OR/WA sperm whale stock (Tables A.3.1, A.3.2, and A.3.3). The 5-year (2009-2013) average annual HCM/SI, including ship strikes and incidental to all commercial fishing is 3.4 or 125.90% of the PBR for the CA/OR/WA sperm whale stock (Table A.3.1, A.3.2, and A.3.3).

Explanation of Negligible Impact Analysis for Humpback Whales for all timeframes
We provide the 16-year, 13-year, and 5-year time frames for humpback whales here as a comprehensive evaluation of all of the timeframes considered. The 16-year annual average M/SI to the CA/OR/WA stock of humpback whales from all human-caused sources, including commercial fisheries (3.31 animals) plus ship strikes (0.69 animals), is 4.0 animals, which is 36.37% of this stock's PBR (11.0 animals/year). Total human-caused M/SI is therefore above the 10% of PBR threshold, but below PBR. The 13-year annual average M/SI to the CA/OR/WA stock of humpback whales from all human-caused sources, including commercial fisheries (3.69 animals) plus ship strikes (0.77 animals), is 4.46 animals, which is 40.55% of this stock's PBR (11 animals/year). Total human-caused M/SI is therefore above the 10% of PBR threshold, but below PBR. The 5-year annual average M/SI to the CA/OR/WA stock of humpback whales from all human-caused sources, including commercial fisheries (4.4 animals) plus ship strikes (0.6 animals), is 5.0 animals, which is 45.45% of this stock's PBR (above the 10% of PBR threshold, but below PBR). In addition, the population for this stock is considered to be increasing by 8% per year (Carretta *et al.*, 2014). Based on the above, the conditions have been met for applying Criterion 3 (see Table A.3.3) to the analysis of impacts to humpbacks. However, it is not appropriate to use the 13-year timeframe for humpback whales at this time because the current SAR for the CA/OR/WA humpback whale stock as not been updated to include this longer timeframe nor has there been any peer-reviewed publication applying this method to humpback whales. In the future, this method of estimation of bycatch through the pooling of longer time series of data may be applied to other rarely caught marine mammal species, such as the humpback whale.

Explanation of Negligible Impact Analysis for Sperm Whales for all timeframes

We provide the 16-year, 13-year, and 5-year timeframes for sperm whales here as a comprehensive evaluation of all of the timeframes considered. The 16-year annual average M/SI to the CA/OR/WA stock of sperm whales from all human-caused sources, including commercial fisheries (1.56 animals) plus ship strikes (0.25 animals), is 1.8 animals, which is 67.16% of this stock's PBR (below the 10% of PBR threshold and PBR). The 13-year annual average M/SI to the CA/OR/WA stock of sperm whales from all human-caused sources, including commercial fisheries (1.53 animals) plus ship strikes (0.23 animals), is 1.7 animals, which is 65.50% of this stock's PBR (above the 10% of PBR threshold and below PBR). The 5-year annual average M/SI to the CA/OR/WA stock of sperm whales from all human-caused sources, including commercial fisheries (3.2 animals) plus ship strikes (0.2 animals), is 3.4 animals, which is 125.90% of this stock's PBR (above the 10% of PBR threshold and greater than PBR). The population is considered to be stable (Moore and Barlow, in press). Based on the above, the conditions have been met for applying Criterion 3 (see Table A.3.3.) to the analysis of impacts to sperm whales for the pooled data of 16-year and 13-year timeframes. A negligible impact

determination cannot be made for the 5-year timeframe because none of the criteria are satisfied. However, it is not appropriate to use the 5-year timeframe for sperm whales because, as recommended by Carretta and Moore (2014) and Moore and Barlow (in press), pooling data over longer periods of time increases the precision and accuracy of the mortality and serious injury.

Table A. 3.1. Mortality and serious injury incidental to commercial fisheries and ship strikes for humpback and sperm whales (1998-2013).

Humpback Whale

Year	Fishery	Observed fishery M/SI (observer coverage rate)	Extrapolated takes from observed M/SI	Other reported fishery M/SI	Non-fishery human caused M/SI (source)	Minimum fishery M/SI (includes extrapolated values)	Minimum total M/SI (includes extrapolated values)	PBR for that year
1998	Spot prawn			1		1	1	
1999	Unknown net			2		2	2	0.8
2000	Unidentified			1	1(ship strike)	2	3	1.7
	Unknown net			1				
2001	Pot gear			1		1	1	1.9
2002								1.6
2003	Crab pot			3		5	5	1.35
	Pot gear			1				
	Unknown			1				
2004	Unknown			1	1(ship strike)	1	2	1.6
2005	Trap pot			2	1(ship strike)	3	4	2.3
	Spot prawn			1				
2006	Unidentified			2	1(ship strike)	5	6	
	Sablefish trap			1 (id by license #)				
	Gillnet			1				
	Unidentified trap/pot			1				
2007	Gillnet			1	1(ship strike)	5	6	
	Trap gear			1				
	Crab gear			1				
	Unidentified			2				
2008	Dungeness crab gear			1*	3(ship strike)	6	9	2.5
	Unidentified net			2				
	Crab pot			2				

Year	Fishery	Observed fishery M/SI (observer coverage rate)	Extrapolated takes from observed M/SI	Other reported fishery M/SI	Non-fishery human caused M/SI (source)	Minimum fishery M/SI (includes extrapolated values)	Minimum total M/SI (includes extrapolated values)	PBR for that year
	Unidentified pot/trap			1				
2009	CA drift gillnet			1(self-report)		3	3	2.5
	Unidentified			1				
	Unidentified net			1				
2010	Unidentified			3	1(ship strike)	8	9	11.3
	Crab pot			5				
2011	Unidentified pot/trap			3	1(ship strike)	9	10	
	Crab pot			2				
	WA recreational crab			4				
2012	Unidentified			1		2	2	
	Unidentified pot/trap			1				
2013					1 (ship strike)		1	
Total 1998-2013					11	53	64	
Average 1998-2013					0.69	3.31	4.0	
Ratio 16-year Average Annual to Most Recent PBR (PBR=11.0)					6.27%	30.10%	36.37%	
Total 2001-2013					10	48	58	
Average 2001-2013					0.77	3.69	4.46	
Ratio 13-year Average Annual to Most Recent PBR					7.00%	33.55%	40.55%	

Year	Fishery	Observed fishery M/SI (observer coverage rate)	Extrapolated takes from observed M/SI	Other reported fishery M/SI	Non-fishery human caused M/SI (source)	Minimum fishery M/SI (includes extrapolated values)	Minimum total M/SI (includes extrapolated values)	PBR for that year
(PBR=11.0)								
Total 2009-2013					3	22	25	
Average 2009-2013					0.6	4.4	5.0	
Ratio of 5-year Average to Most Recent PBR (PBR=11.3)					5.45%	40.00%	45.45%	

*Comment in report indicated that trailing gear did not appear life threatening, but after further review, considered a SI.

Sperm Whale

Year	Fishery	Observed fishery M/SI (observer coverage rate)	Extrapolated takes from observed M/SI	Other reported fishery M/SI	Non-fishery human caused M/SI (source)	Minimum fishery M/SI (includes extrapolated values)	Minimum total M/SI (includes extrapolated values)	PBR for that year
1998	CA drift gillnet	1 (20%)	5			5	5	
1999								2.0
2000					1(ship strike)		1	2.0
2001								2.1
2002					1(ship strike)		1	
2003								1.8
2004	Unknown net			1*		1	1	
2005								
2006								
2007					1(ship strike)		1	3.4
2008				3**		3	3	9.3
2009					1(ship strike)			
2010	CA drift gillnet	2 (11.9%)	16			16	16	1.5
2011								
2012								
2013								2.7
Total 1998-2013					4	25	29	
Average 1998-2013					.25	1.56	1.8	
Ratio of 16-year Average to Most Recent PBR (PBR=2.7)					9.26%	57.90%	67.10%	
Total 2001-2013					3	20	23	
Average 2001-2013					.23	1.53	1.7	
Ratio of 13-year Average to Most Recent PBR (PBR=2.7)					8.50%	57.00%	65.50%	

Total 2009-2013					1	16	17	
Average 2009-2013					0.2	3.2	3.4	
Ratio of 5-year Average to Most Recent PBR (PBR=2.7)					7.41%	118.50%	125.90%	

* Net did not have a full complement of pingers
** Monofilament netting found in stomach

Table A.3.2. Percentages representing the ratio of average annual human-caused mortality and serious injury (HCM/SI) relative to PBR.

HUMPBACK WHALE CURRENT PBR=11.0	
FISHING: 5-year (2009-2013)=40.00%	5-year fishing and ship strikes total=45.45%
SHIP-STRIKE: 5-year (2009-2013)=5.45%	
FISHING: 13-year (2001-2013)=33.55%	13-year fishing and ship strikes total=40.55%
SHIP-STRIKE: 13-year (2001-2013)=7.00%	
FISHING: 16-year (1998-2013)=30.10%	16-year fishing and ship strikes total=36.37%
SHIP-STRIKE: 16-year (1998-2013)=6.27%	
SPERM WHALE CURRENT* PBR=2.7	
FISHING: 5-year (2009-2013)=118.50%	5-year fishing and ship strikes total=125.90%
SHIP-STRIKE: 5-year (2009-2013)=7.41%	
FISHING: 13-year (2001-2013)=57.00%	13-year fishing and ship strikes total=65.50%
SHIP-STRIKE: 13-year (2001-2013)=8.50%	
FISHING: 16-year (1998-2013)=57.90%	16-year fishing and ship strikes total=67.10%
SHIP-STRIKE: 16-year (1998-2013)=9.26%	

* The fishing totals for sperm whales include those animals that stranded with netting/fishing gear in their stomachs. It is not clear how the ingestion occurred (i.e., whether they were interacting with fishing or ingested ghost nets); however, the amount of gear in the stomach was determined to be the cause of death. In the previous NID, we included ingestion of gear under fisheries takes, so we continue this practice to be consistent until more is known.

Table A.3.3. Minimum all human-caused mortality and serious injury (HCM/SI) and all fisheries-related mortality or serious injury (M/SI) used in the negligible impact analysis.

Humpback Whales	Current PBR	All HCM/SI	All HCM/SI annual average	All HCM/SI as a % of PBR	All Fisheries M/SI	All Fisheries M/SI annual average	All Fisheries M/SI % of PBR
16-year	11.0	64	4.0	36.37%	53	3.31	30.10%
13-year	11.0	58	4.46	40.55%	48	3.69	33.55%
5-year	11.0	25	5.0	45.45%	22	4.4	40.00%

Sperm Whales	Current PBR	All HCM/SI	All HCM/SI annual average	All HCM/SI as a % of PBR	All Fisheries M/SI	All Fisheries M/SI annual average	All Fisheries M/SI % of PBR
16-year	2.7	29	1.8	67.16%	25	1.56	57.90%
13-year	2.7	21	1.7	65.50%	20	1.53	57.00%
5-year	2.7	17	3.4	125.9%	16	3.2	118.5%

Table A.3.3. Result for the Application of the Negligible Impact Determination Criterion by stock.

CA/OR/WA stock	**Is Criterion 1 Satisfied?** Total known, assumed, or extrapolated HCM/SI are less than 10% of PBR	**Is Criterion 2 Satisfied?** Total know, assumed, or extrapolated HCM/SI > PBR, and fisheries-related mortality is less than 10% of PBR	**Is Criterion 3 Satisfied?** Total known or extrapolated fisheries-related M/SI > 10%of PBR and less than PBR and the population is stable or increasing	**Is Criterion 4 Satisfied?** If abundance is declining, the threshold level of 10% of PBR will continue to be used and a more conservative criterion is warranted.	**Is Criterion 5 Satisfied?** If total known or extrapolated fisheries-related M/SI > PBR, permits may not be issued
Humpback whale	**No.** Not Satisfied, go to Criterion 2	**No.** Not Satisfied, go to Criterion 3	**Yes**. The total known or assumed 5-year fishery-related M/SI is >10% of PBR (40.00%), and the total 13-year fishery-related M/SI is greater than 10% of PBR (33.55%), and the total known or assumed 16-year fishery-related M/SI is >10%of PBR (30.10% PBR), but less	*Previous Criterion Already Satisfied*	*Previous Criterion Already Satisfied*

			than PBR (PBR=11.0). The population is increasing.		
Sperm whale	**No.** Not Satisfied, go to Criterion 2	**No.** Not Satisfied, go to Criterion 3	**Yes for 16 and 13-year Pooled Data.** The total known or extrapolated 13-year fishery-related M/SI is 57.00% PBR and the total 16-year fishery-related M/SI is 57.90%, both greater than 10% of PBR, but less than PBR (PBR=2.7). The population is stable. **No for 5-year.** Not satisfied, go to Criterion 4.	*Previous Criterion Already Satisfied for 16- and 13-year pooled data.* ***No for 5-year.*** *Abundance is not declining.*	*Previous Criterion Already Satisfied for 16-and 13-year pooled data.*

19.0 APPENDIX 4

Comparison of human-caused mortality and all fisheries-related mortality and serious injury for sperm whales relative to two PBR estimates: the PBR of 1.5 that was used in the previous negligible impact determination issued on September 4, 2013 (78FR54553) and the PBR of 2.7 used in this proposed negligible impact determination.

To offer the reader with a comprehensive review of the most recent PBR estimates for sperm whales and the application of the negligible impact determination criterion, we provide a comparison using a PBR of 1.5 and a PBR of 2.7 animals across all time frames (Table A.4.1). Even though we provide this comparison, a PBR of 2.7 animals is the only PBR level used to make the negligible impact determination.

In 2013, the level of sperm whale take from commercial fisheries was above that year's current sperm whale PBR of 1.5 animals and a negligible impact determination under the MMPA could not be made for sperm whales, if the fishery continued to operate under the status quo. NMFS published an emergency rule on September 4, 2013 (78 FR 54547) that modified the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) to reduce the risk of incidental mortality and serious injury of sperm whales incidental to the fishery, such that the negligible impact determination conditions of the MMPA section 101(a)(5)(E) could be met, thereby allowing NMFS to provide incidental take authorization under the ESA and the MMPA. That emergency rule was extended (79 FR 29377; May 22, 2014) and will expire on August 5, 2014. NMFS intends to implement, per the Terms and Conditions in the biological opinion on the continued management of the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh) under the Fishery Management Plan for the U.S. West Coast Fisheries for Highly Migratory Species, issued on May 2, 2013, certain measures that were also included as part of the emergency rule (*i.e.,* Vessel Monitoring Systems and 48 hour pre-trip notification to NMFS). The modifications in the emergency rule were made to reduce the sperm whale bycatch so that total fisheries-related take would be less than PBR. Total fisheries-related takes, at this time, are no longer above PBR (2.7 sperm whales), therefore a negligible impact determination can be made without modifications to the CA thresher shark/swordfish drift gillnet fishery (≥14 in mesh). In Table A.4.1, a negligible impact determination can only be made with a PBR of 2.7 sperm whales for the 16-year and 13-year time frames. While we offer the analysis for the 5-year time frame and the previous PBR estimate, none of those scenarios are valid because 1) Carretta and Moore (2014) recommend pooling longer time series of data particularly when bycatch is a rare event and found that pooling only 5 years of data was not sufficient to accurately estimate the mean bycatch of a marine mammal species with rare fishery interactions, which is the case for sperm whales; and, 2) Moore and Barlow (in press) calculated a new estimate for PBR of 2.7 sperm whales.

Table A.4.1. Minimum of all known, assumed, or extrapolated human-caused mortality and serious injury (HCM/SI) and all known or extrapolated fisheries-related M/SI comparing the previous PBR of 1.5 and the current PBR of 2.7 sperm whales.

Sperm Whales	PBR	All HCM/SI	All HCM/SI annual average	All HCM/SI as a % of PBR	All Fisheries M/SI	All Fisheries M/SI annual average	A
16-year	1.5	29	1.8	120.80%	25	1.56	
13-year	1.5	21	1.7	113.30%	20	1.53	
5-year	1.5	17	3.4	226.70%	16	3.2	

Sperm Whales	PBR	All HCM/SI	All HCM/SI annual average	All HCM/SI as a % of PBR	All Fisheries M/SI	All Fisheries M/SI annual average	A
16-year	2.7	29	1.8	67.16%	25	1.56	
13-year	2.7	21	1.7	65.50%	20	1.53	
5-year	2.7	17	3.4	125.90%	16	3.2	